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THE QUARTERLY REVIEW OF COMMERCE

The St. Lawrence Seaway — *R. B. Willis*

Government Finance—Canada — *E. A. Horton*

An Analysis of the Contents of Sixteen Canadian Farm Publications for the Year 1940 — *M. Y. Sheppard*

Volume VIII No. 4

1941

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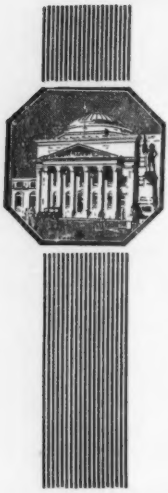

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The St. Lawrence Seaway — *R. B. Willis* — 249

Government Finance—Canada — *E. A. Horton* — 304

An Analysis of the Contents of Sixteen Canadian Farm Publications for the Year 1940 — *M. Y. Sheppard* — 312

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THE QUARTERLY REVIEW OF COMMERCE

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THE ST. LAWRENCE SEAWAY

ECONOMICS FOR CANADIANS

R. B. WILLIS

In these world war days there are many questions of national importance that must be answered. With a view to stimulating public interest in these major issues, The Quarterly Review of Commerce will from time to time publish analyses of such national problems. We are pleased to present such a study of the St. Lawrence Seaway project by Prof. R. B. Willis of the Department of Business Administration, the University of Western Ontario.

* * *

FOR reasons difficult to discover, although possibly having their origin partly in the vastness and grandeur of their countries and partly in the heritage of the pioneer spirit, Americans and Canadians possess an innate liking for projects of gargantuan proportions. The Panama and Welland Canals, Beauharnois, Grand Coulee, Bonneville, the Tennessee Valley Authority—these are but examples of "mountain-skipping ideas that most Americans (and Canadians) instinctively like and that seem to swallow the objections of interested parties like a century of United States (or Canadian)[1] History."[2]

These factors perhaps account in no small measure for the periodic recurrence of proposals for the development of a great inland waterway extending from Lake Superior to the sea by way of the St. Lawrence

[1]The portions in parenthesis were added by the writer.

[2]TIME, July 7, 1941, page 58.

capable of affording passage to all but the largest ocean vessels. It is a grave error, however, to assume as do many proponents that such a seaway does not now exist in part, or one so wholly unsuited to handling the traffic available as to be deemed non-existent. In reality, by virtue of the investment of hundreds of millions of dollars, the major portion of it by the Dominion of Canada, a fourteen-foot channel now exists from Lake Ontario to the sea and a much deeper channel has been created from Lake Ontario to Lake Superior. The net result is the existence in North America of the most significant system of inland navigation in the world. Any development at the present is not a question of initiating but of completing a project long since undertaken.

Issues Are Confused

Proposals for the development and expansion of the waterway unfortunately have been the subject of much confusion in the public mind. The arguments have been obscured by the inclusion of the power aspect as well as navigation, by sectionalism, at times of the most virulent type, and by emotionalism. In its report of December 19, 1921, the International Joint Commission appointed by the governments of the United States and Canada pointed out:

> "The main points of difference between those who advocated and those who opposed the project were as to whether or not ocean-going ships could or would use the deep waterway if it were constructed; and whether or not there would be sufficient cargoes outbound or inbound to make the route a success and to justify the very considerable expense involved in its improvement. Involved in these major questions were many minor points of difference, such as the limited season of navigation on the lakes and the St. Lawrence, ice conditions, fog, restricted channels, limited depths in inland waters, insurance rates, competition between lake freighters and ocean craft, the necessity of deepening connecting channels and harbors, harbor facilities on the lakes and on the seaboard, the time factor as affecting the voyages to and from the head of the lakes, the possibility of developing water-borne traffic between lake ports and Atlantic or Pacific coast ports, the possible influence of the new route in stimulating existing avenues of production and creating new ones, ship channels versus barge canals, rail versus water transportation, effect of the water route on railroad congestion, ocean rates and inland water rates, bulk freight and package freight on the lakes, relative cost of building and operating ocean ships and lake vessels, and the practicability of each, practicability of a composite type of vessel adapted to both ocean and lake traffic, shipbuilding on the lakes, grain movement to the seaboard, transshipment charges and losses, natural resources of the region

tributary to the Great Lakes, its industrial development, banking facilities, alternative routes to the seaboard, etc,

> *"It should perhaps be noted that much of the evidence was more or less irrelevant in the sense that it had no particular bearing on the question of the practicability of the proposed improvement from either a negative or a positive point of view."*[3]

On March 19, 1941, the United States and the Dominion of Canada after protracted negotiation executed an agreement, subject to ratification by Congress and Parliament respectively, "providing for a coöperative development and utilization of the water in the Great Lakes-St. Lawrence River basin for navigation and power." Once again confusion has been the keynote of the discussions, particularly in the United States, where the proposals have been under the scrutiny of the Committee on Rivers and Harbors of the House of Representatives. The confusion has even extended to errors such as the following from the prepared testimony of one of the highest officials in the United States, who pointed out that the seaway was designed to eliminate "the bottle-neck in the Great Lakes which at this time is the Welland Canal."

Little Public Interest in Canada

In the Dominion unfortunately there has been a regrettable absence of public interest in the agreement, extending almost to apathy. In view of our preoccupation with World War II, and having regard to the filing of the Rowell-Sirois Report because it was regarded unworthy of discussion at this time, this lack of interest in the more restricted spheres of navigation and power is perhaps understandable.

On the other hand, the necessities of an all-out effort by Canada in the present world struggle which will require shortly, if not now, the complete utilization of our resources of men, money and materials, demand that every public expenditure be analyzed painstakingly and without prejudice, in the light of this contribution to ultimate victory. Speaking in the House of Commons on February 25, 1941, the Right Honorable W. L. Mackenzie King said:

> "I agree altogether with the view expressed here this afternoon that the St. Lawrence Waterway development as a project in time of war can be justified only on the basis of war necessity."

This study accordingly seeks to examine the proposals contained in the Agreement of 1941 from the Canadian point of view with the objective of achieving a wider understanding of the factors involved.

[3]St. Lawrence Waterway, Senate Document No. 114, 67th Congress, Second Session, page 53. (The portion in italics is that of the author.)

Major emphasis is placed upon the economic aspects and on the relationship of the project to national defence. The engineering considerations which possibly surpass those encountered in any project in history have been regarded only in their relationship to the whole, a limitation necessarily imposed in the final analysis upon any layman.

Seaway Is Not New Project

Before embarking upon a discussion of the present agreement, a brief review of the historical background would appear valuable in promoting a clearer understanding of the issues involved. As mentioned previously, the dream of a great inland waterway from the interior of the North American continent to the Gulf of St. Lawrence is not new. As Glazebrook in his excellent history of transportation in Canada[4] points out, discussions with reference to canals facilitating the passage of the St. Lawrence took place before the Seven Years War.

Early in the British regime some minor canals were developed, at Sault Ste. Marie and on the Soulanges section of the St. Lawrence, but any coördinated effort to circumvent the obstructions to navigation in the Great Lakes-St. Lawrence system had to await the presence of population and commercial enterprise. It was also natural that early proposals for the waterway project should have their origin in Canada. Enthusiasts for the scheme counted not only on the movement for cheaper methods of transporting grain to the seaboard, as well as the desire for a reduction in the cost of imports to attract adherents but also on gaining access by reciprocity to the profitable markets of the United States and a share in its carrying trade.

By the terms of the Treaty of 1783 ending the War of American Independence the boundary between the United States and Canada was first defined. In writing the treaty of peace at the conclusion of the War of 1812, the commissioners appointed by the United Kingdom and the United States reaffirmed this boundary but attempted to set it down in more precise terms.

U. S. Given Rights on St. Lawrence

Although the Ashburton-Webster Treaty of 1842 and the Reciprocity Treaty of 1854 granted free navigation rights to the ships of both parties on the Great Lakes and the St. Lawrence, it was not until

[4]Glazebrook, G. P. deT.: *A History of Transportation in Canada* (The Ryerson Press, Toronto, 1938). The reader also is referred to Stephens, G. W.: *The St. Lawrence Waterway Project* (Montreal, 1930); Wright, C. P.: *The St. Lawrence Deep Waterway* (Toronto, 1935) and *The St. Lawrence Survey*, Part I (United States Government Printing Office, 1940).

1871 by virtue of the Treaty of Washington that the perpetual right of the United States to utilize the waters of the St. Lawrence below the International Boundary for navigation was granted. Since 1903, Canadian canals have been free of tolls to American and Canadian vessels alike.

In 1870 the Dominion appointed a Royal Commission to consider the adequacy of the existing canals and the desirability of constructing new ones. In their majority report submitted in the following year the commissioners pointed out:

> "The commerce of this fertile and progressive country . . . depends on several routes of communication. Nature has intended the St. Lawrence to be the great commercial highway of the West, and if it has not fulfilled its destiny to the extent it should have done, it is because the enterprise of man has endeavored to divert its trade into other and artificial channels."

The recommendations of this commission were, briefly—that the Welland and St. Lawrence Canals should be deepened to provide a draft of 12 feet with locks 270 feet long and that the construction of a Canadian canal at Sault Ste. Marie should be commenced at once. Strangely, the report of this Royal Commission was converted into action unlike that of so many to succeed it in investigating transportation and the necessary enlargements were undertaken, but with a standard depth in the canals of 14 feet rather than 12. Simultaneously, improvements in navigation, etc., were being made on the American side.

Waterways Association Organized

With the settlement of the great prairie areas of both countries and the extension of railway facilities to these areas on a scale which still defies the imagination, agitation began to develop toward the end of the 19th century for further development of the Great Lakes - St. Lawrence route. In September, 1895, the movement assumed a more formal character in the organization of the International Deep Waterways Association which first convened at Cleveland.

Although considerable negotiation and investigation took place thereafter, both by interested parties and by the governments of the two countries, the real impetus to the movement was given by the opening of the Panama Canal. This project, it was realized, had established an economic barrier around the midwestern area—a fact capable of very general appreciation after the termination of hostilities in 1918,

when the surplus of ocean tonnage drove coastal shipping rates in the United States to absurdly low levels.

Although an official move on the part of the Untied States was taken by Senate resolution in 1913, it was not until 1920 that the Canadian and American governments requested the International Joint Commission to examine the possible improvement of the St. Lawrence for navigation and power. Undoubtedly, the sponsorship given the project by the formation in 1919 of the Great Lakes-St. Lawrence Tidewater Association had considerable to do with the action of the two governments in the following year.

International Joint Commission Established

The International Joint Commission had been established as a permanent body in 1909 by the Boundary Waters Treaty, which was ratified in the following year.[5] Under Article III of the Treaty:

> "It is agreed that, in addition to the uses, obstructions and diversions heretofore permitted or hereafter provided for by special agreement between the parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdictions, and with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission."

The terms of reference to the Commission were extensive, requiring them to investigate not only the engineering aspects but also power, alternative routes, costs and their allocation, methods of control, traffic existing and potential and the economic implications. On December 19, 1921, after extensive public hearings and a detailed engineering investigation in charge of Lt.-Col. W. P. Wooten of the Corps of Engineers, U. S. Army, and W. A. Bowden, Chief Engineer of the Department of Railways and Canals of Canada, the Commission under the joint chairmanship of O. Gardner and C. A. Magrath made the following recommendations:[6]

(a) Development of the St. Lawrence for both navigation and power

[5]It should be pointed out that this Commission was the outgrowth of the joint standing International Joint Waterways Commission created in 1905 by the two countries. The latter body was directly responsible for the Boundary Waters Treaty of 1909.

[6]Cf. St. Lawrence Waterway, Senate Document No. 114, 67th Congress, Second Session (U. S. Government Printing Office, 1922).

was quite feasible from both engineering and economic considerations.

(b) The existing means of transportation in the United States between the seaboard and the area tributary to the Great Lakes was wholly inadequate.

(c) Having regard to these factors, a treaty should be entered into between the two countries to carry out the project.

(d) Costs of the development were to be divided in proportion to the benefits each country derived, periodically adjusted.

(e) "That the proposed works between Montreal and Lake Ontario be based upon a report of the engineering board accompanying this report, but that before any final decision is reached a report of the board, together with such comments, criticisms, and alternative plans as have been filed with the Commission, be referred back to the board enlarged by other leading members of the engineering profession, to the end that the whole question be given the further and complete study that its magnitude and importance demand."

The engineering report as submitted suggested a channel 25 feet in depth but with structures designed to permit an eventual draft of 30 feet. The estimated cost of a 25-foot channel from Montreal to Lake Ontario, together with the development of 1,464,000 horsepower in the International Rapids section, was established at $252,728,200.

In 1924, the proposed Joint Board of Engineers was established, consisting of six members, three appointed by each government. About the same time President Coolidge appointed a non-technical advisory committee, the St. Lawrence Commission of six members headed by the Hon. Herbert Hoover, Secretary of Commerce. Canada appointed a similar National Advisory Committee, under the chairmanship of the Hon. G. P. Graham, Minister of Railways and Canals.

Report of Engineers in 1926

The Joint Board of Engineers reported late in 1926. They estimated the total ultimate cost of improvements, comprising a 25-foot channel in the St. Lawrence and fully developed power resources at $620,000,000 - $650,000,000, depending upon the type of development utilized.[7] The engineers estimated that the cost of channel improvements above Lake Ontario would be an additional $45,000,000 but that initial improvements might be carried out upon a satisfactory basis to provide an adequate waterway and power project at from $350,000,000

[7]Report of the Joint Board of Engineers on the St. Lawrence Waterway Project (King's Printer, Ottawa, 1927).

to $385,000,000. Although the members were unanimous as to the major features, considerable differences had arisen over the placing of dams, the route of the channel, the depth to be attained and whether the power facilities were to be a "single-stage" or "two-stage" development. The Canadian engineers strongly favored a 27-foot channel and a two-stage power plan, whereas the American representatives favored a 25-foot channel and a single-stage hydro-electric undertaking.

Negotiations for a Treaty

Following the submission of this report, and a survey by the United States Department of Commerce which recommended the St. Lawrence seaway over alternative routes, the St. Lawrence Commission reported in 1926 favoring the immediate improvement of the river for navigation and power purposes, but suggesting that adequate recognition be given the State of New York with respect to the power phases and suggesting the early execution of an agreement with the Dominion.

In April, 1927, the State Department presented the conclusions of this Commission to the Canadian Government. The Dominion, however, immediately requested postponement of any negotiations pending the completion of the appendices to the Joint Engineers' Report. In January, 1928, the Dominion of Canada presented its views, together with those of its National Advisory Committee, to the State Department. Declaring that it felt discussions leading to the conclusion of an agreement or treaty were premature in view of the litigation before the Supreme Court of Canada regarding the water power rights enjoyed by the Dominion and the Provinces, and having regard to the absence of unanimity among the engineers as to the power proposals, the Prime Minister requested deferment pending the settlement of these matters. In addition, he expressed himself as opposed to undertaking heavy financial burdens in view of the problems consequent upon the Great War.[8]

The interest of the State of New York in the power development led to the creation in 1930 of the St. Lawrence Power Development Commission and the establishment of the Power Authority of the State of New York in the following year. Negotiations immediately were begun between the Government of the United States and this Authority under which the latter, upon payment of $89,726,000, would receive all

[8]No mention has been made of the Special International Niagara Board which was appointed in 1926 to investigate deterioration in the scenic beauty of Niagara Falls. Reporting in 1927, the recommendations of this Board were later embodied in the Niagara Convention and Protocol defeated by the Foreign Relations Committee of the United States Senate on February 18, 1931.

power developed in the American section of the waterway together with the title to the power works and the lands on which they were located.

Deep Waterways Treaty, 1932

By July, 1932, negotiations between the United States and Canada had proceeded to the stage at which a treaty could be submitted to the respective legislatures for ratification. Signed at Washington and embodying the terms of the agreement, the Deep Waterways Treaty concerned itself primarily with the International Rapids section, where a 27-foot channel was to be created as well as power developed. Costs were to be divided approximately equally between the two countries, Canada receiving credit to the amount of $128,000,000 for her expenditures on the new Welland ship canal. The remainder of the improvements necessary to provide a channel of similar depth from Montreal to Lake Superior were to be the independent responsibility of the respective governments.

Concurrently, the Province of Ontario and the Dominion executed an agreement, never before either Parliament for ratification, under the terms of which Ontario was to pay $67,202,500 as its share of the works common to navigation and power, plus $36,930,530 representing the cost of the superstructure and equipment in the Canadian powerhouse. In return, Ontario was to receive all electrical energy developed on the Canadian side.

U. S. Senate Defeats Treaty

From November, 1932, until February, 1933, the Committee on Foreign Relations of the United States Senate held extensive hearings on the treaty. Although recommended by the Committee by a majority of ten, lengthy and stormy discussions took place thereafter in the Senate until March, 1934. Despite the urgings of President Roosevelt, and the knowledge that Presidents Harding, Coolidge and Hoover had also advocated the project, the Senate on March 14, 1934, rejected the treaty by a vote of 46 in favor and 42 opposed.[9]

The discussions in the Senate had been protracted, bitter and at times confused. Suggestions were even advanced that the British Government hoped by means of the proposal to secure a naval base on Lake Michigan. The arguments both for and against the waterway were marked by sectionalism, partisanship and emotionalism as well as frequent clashes between the proponents themselves.

[9]Under American constitutional law, treaty ratification requires a two-thirds vote of the United States Senate.

With the action of the Senate, all that remained of the seaway route was the new Welland ship canal, open to the largest lake vessels in 1932, with a depth of 25 feet. The dimensions of the locks in the new canal were 859 feet in length, 80 feet in width and 30 feet over the sills. In general, the status of navigation on the St. Lawrence and Great Lakes was limited by the St. Lawrence canals (depth 14 feet), the Welland ship canal (depth 25 feet) and the American locks at Sault Ste. Marie (depth 24.5 feet), and the depths in the St. Marys River (1940—18 feet, 11 inches) and the Detroit River (1940—19 feet, 7 inches).

Negotiations Renewed in 1938

Until May 28, 1938, the seaway remained essentially a dormant issue although there were frequent interchanges of notes and discussions between the two governments. On May 28, 1938, however, the United States, through its Secretary of State, submitted to the Dominion the draft of a new treaty embodying both navigation and power aspects.[10] In a letter to the Canadian Minister to the United States the Hon. Cordell Hull had this to say of the new proposals:

> "In brief, the proposed treaty would (a) enable the United States to go forward immediately with the International Rapids Section link in the proposed St. Lawrence Deep Waterway and the incidental improvements; (b) defer Canada's responsibility for completing its share of the waterway for a sufficient time to assure the readiness of the Ontario power market to absorb its share of the power; (c) provide for an international commission to develop plans and advise the two governments in a program to promote the most advantageous use of the entire Great Lakes-St. Lawrence resource; (d) assure the immediate undertaking under the supervision of a commission of the proposed remedial works to preserve the scenic beauty of Niagara Falls; (e) permit the Province of Ontario to go forward with its plans for diversions from the Albany River Basin into the Great Lakes and utilize such additional water for power at Niagara; (f) make available considerable additional Niagara power to each country for development at will; and (g) enable the proposed commission to proceed immediately with the preparation of comprehensive plans for more efficient use of the resources of the Niagara River.
>
> "Certain observations on the proposals which have been

[10]It is interesting that the immediate cause of the submission of the draft treaty was the request in January, 1938, by the Dominion for an agreement which would permit the Province of Ontario to divert water from Long Lac into Lake Superior, thus providing additional generating capacity at Niagara Falls on the part of the Hydro-Electric Power Commission of Ontario. The United States promptly replied that in its opinion the interests of all concerned would be best served by a comprehensive agreement embracing the seaway as well.

incorporated in the tentative treaty draft will serve to clarify the extent to which they are designed to meet the needs of both countries:

1. The United States would immediately undertake the development of the International Rapids section of the St. Lawrence River, in accordance with the provisions of the treaty, and would complete all proposed works except the Canadian powerhouse superstructures and their equipment. Thus the most important step in the deep waterway project would be assured without requiring the Government of Canada to undertake the immediate completion of its share of the project or the additional expenditure associated therewith.
2. The State of New York would be able to proceed immediately with the development of 1,100,000 horsepower of cheap hydroelectric power which constitute the American share of the power available in the International Rapids section of the St. Lawrence River. This additional power supply at a cost of less than $8 per horsepower a year would thus be assured to meet its future market requirements.

3. The Province of Ontario would be assured an equivalent reserve of cheap St. Lawrence power available to meet its requirements whenever the supplies provided in the present contracts with Quebec companies shall have been absorbed, without the assumption of any financial obligation until it needs the power. This would guarantee the Province of Ontario an economical power supply for many years to come. Furthermore, the Province would be relieved of the necessity of anticipating future market requirements by more than two years because, after completion by the United States of other works in the International Rapids Section, such a period would be ample for the construction of the required powerhouse facilities.

4. The civic interests in both countries concerned with the preservation of the scenic beauty of the Niagara Falls and Rapids would be assured the immediate undertaking of the remedial works to distribute the waters of the Niagara River in such a way as to insure unbroken crestlines on both the American and Canadian Falls, as recommended in the 1928 report of the Special International Board and embodied in the unratified 1929 Convention and Protocol between the two countries.

5. The Province of Ontario would be assured the opportunity of proceeding with its projects designed to divert the waters of certain tributaries of the Albany River into the Great Lakes-St. Lawrence River Basin and would acquire the right to use such waters for additional power development at Niagara and eventually in the International Rapids Section of the St. Lawrence River. Under present plans this would make an additional 100,000 to 150,000 horsepower at Niagara as soon as the diversion projects shall have been completed.

6. Both countries would be assured not only the immediate possibility of developing considerable additional supplies of very cheap hydro-electric power at Niagara but also the initiation of the first scientific approach to the development of a comprehensive plan for the utilization of the Niagara River. Such a plan would provide both for the enhancement of scenic spectacle and for future power development, which would prove an important contribution to economic expansion on both sides of the boundary.

7. The important economic areas tributary to the Great Lakes-St. Lawrence Basin on both sides of the border would be assured of the realization of their desire that ocean navigation be brought to the heart of the continent while, at the same time, the period within which completion of the deep waterway would be contemplated would be sufficient to provide a natural growth of traffic assuring the railroads the ability to adjust themselves to the new transportation agency without financial hardship.

8. Both countries would be assured a continuing basis of coöperation in the planned utilization of one of the world's greatest natural resources. Provision would be made for the prompt solution on a sound technical basis of all problems, including those of navigation, power, lake levels, diversions from and into the basin, etc., in terms of the mutual interests of the two peoples.

"May I express the hope that the Government of Canada will find in the proposals herein outlined a satisfactory basis for the undertaking at an early date of negotiations for a treaty and the expediting of such negotiations to the end that the interests of both peoples in the Great Lakes-St. Lawrence resource may be most effectively served?"[11]

Opposition Develops in Canada

The reception of the new proposals by the Provinces of Ontario and Quebec was far from cordial. On August 19, 1938, the Hon. M. F. Hepburn wrote to the Rt. Hon. W. L. Mackenzie King:

"Insofar as power requirements are concerned, the fact is well known to you that Ontario has an ample supply for many years to come—indeed a huge surplus—for which it must pay and receive no benefit. This unsatisfactory condition would not obtain at this moment had you granted us, when you had the opportunity, the right to export this surplus at a profit which would have enabled us in turn to grant a further reduction in rates to the power consumers of Ontario . . .

"I have on various occasions ventured the opinion that the St. Lawrence Waterways project could not be justified on economic

[11]Correspondence and Documents relating to The Great Lakes-St. Lawrence Basin Development 1938-1941, pages 21-23 (King's Printer, Ottawa, 1941).

grounds. Our interests are confined to power but nevertheless as the keystone province of Canada we are also interested in the railway situation which has not improved since you have been head of the administration at Ottawa. Until such time as you solve what is considered to be one of the major problems of Canada—that of the national railway deficits—I cannot conceive how you could seriously consider spending public funds for the purpose of creating another public, competitive avenue of transportation, which would undoubtedly have the effect of further increasing the deficits of the Canadian National Railways; furnish a further threat to the security of the employment of the railway men of Canada even to the extent of placing more people on our already overburdened relief lists; and a further threat to the very credit of the Dominion, the provinces and the municipalities,"[12]

On September 21, 1938, Mr. Hepburn further wrote:

"The attitude of the Province to the power clauses seems obvious to me . . . This Province is simply not interested in the production of any new power . . . To take part in any negotiations which may lead to this end would be unwise and misleading.

"It would appear that the whole project would prove as great a fiasco as the present Hudson's Bay outlet."[15]

Ontario's Attitude Changed

During 1939, however, the attitude of the Province of Ontario underwent a complete "volte-face" and by December 26, 1939, the Dominion was able to address a note to Washington requesting "that a number of questions of detail should be taken up by representatives of the United States and Canada."[16] Subsequently, in January 1940, preliminary conversations took place at Ottawa and at Washington later in the month a substantial agreement was reached.

In October 1940, pending the execution of a final agreement, the United States consented to the diversion at Niagara of additional water for the use of the Hydro-Electric Power Commission of Ontario provided an equivalent diversion were effected from the Hudson Bay Watershed into Lake Superior. This made immediately available 5,000 cubic feet per second or approximately 70,000 horsepower for war production in Ontario.

Investigating Committees Appointed

At the request of the American Government in October, 1940, the two countries agreed to appoint Temporary Committees to undertake

[12] *Ibid*, pages 43 and 44.
[15] *Ibid*, pages 48, 49.
[16] *Ibid*, page 34.

preliminary investigation, the cost to be defrayed by the allocation of $1,000,000 from a special defence fund of the United States. The membership of the two committees was as follows:

CANADA	UNITED STATES
Guy A. Lindsay	Leland Olds
T. H. Hogg	A. A. Berle, Jr.
O. O. Lefebvre	T. M. Robins
J. E. Read	G. V. Cruise

After meetings held in October and November 1940, the committees reported jointly on January 3, 1941, to the two governments, endorsing the report of a joint board of engineers headed by Brig.-Gen. T. M. Robins, Corps of Engineers, U. S. Army, and Guy A. Lindsay, Engineer-in-Charge, General Engineering Branch, Department of Transport, prepared in January, 1940, and approved formally on January 3, 1941.

> "These engineers were requested by the two governments to examine the various plans proposed for the development of the International Rapids Section of the St. Lawrence, together with their estimates of cost, and to recommend the plan best adapted to the needs of both countries. They agreed unanimously that the '238-242' Controlled Single Stage Project was the best from an engineering and economic point of view, bearing in mind the requirements of navigation and power and the protection of down-river interests."[17]

Agreement of 1941

Following submission of the joint report, negotiations were continued terminating in the execution of a final agreement on March 19, 1941, at Ottawa. Concurrently, a new agreement was signed by the Dominion of Canada and the Province of Ontario with reference to the power facilities in the Canadian half of the International Rapids Section.

From June to August 6, 1941, hearings were held on the agreement by the Committee on Rivers and Harbors, United States House of Representatives. On August 8 the Committee by modest majority agreed to recommend inclusion of the agreement in an omnibus Rivers and Harbors Bill. At this writing the Bill is awaiting submission to Congress and actual ratification must be by a majority vote of both Houses of Congress.

* * *

[17]St. Lawrence Deep Waterway International Rapids Section: Reports Submitted to the President of the United States of America and the Prime Minister of Canada by the Canadian Temporary Great Lakes-St. Lawrence Basin Committee and the United States St. Lawrence Advisory Committee (King's Printer, Ottawa, 1941).

The Agreement of 1941—Canada's Undertaking

Before proceeding to any discussion of the implications, economic and otherwise of the present agreement, it would appear desirable to examine briefly its contents from the point of view of the Canadian undertaking. The Great Lakes - St. Lawrence Agreement of 1941 embraces in one document the essential features of the Niagara Convention and Protocol of 1929 and the St. Lawrence Deep Waterway Treaty of 1932.[18]

It is possibly interesting that the present arrangement takes the form of an agreement and not a treaty. This difference undoubtedly has its origin in the constitutional system of the United States and the defeat of the 1932 pact. Under that system, validation of international treaties by Presidential signature is contingent upon approval by two-thirds vote of the Senate, whereas agreements may be executed after a majority vote of both Houses of Congress. In Canada, on the other hand, the Governor-General-in-Council, *i.e.*, the Cabinet, is empowered to execute a treaty or agreement without the authorization of Parliament—the power of the Legislature to prevent any undertakings which it deems unwise, resting upon the fact that the necessary appropriation of money or other legislation to implement the undertaking must be voted by the House of Commons.

Salient Features of Agreement

The salient features of the Agreement of March 19, 1941,[19] may be enumerated as follows:

(a) A Great Lakes-St. Lawrence Basin Commission of not more than ten members is to be appointed jointly by the two countries to carry out and to supervise the project.

(b) The construction of the remainder of a 27-foot waterway from the head of the Great Lakes to Montreal is to be effected by means of dredging and the construction of new locks and dams.

(c) Through a combined power-navigation plan in the International Rapids Section of the St. Lawrence, hydro-electric power is to be

[18]Votes and Proceedings of the House of Commons of Canada, No. 46 (King's Printer, Ottawa, March 21, 1941). Also Cf. Correspondence and Documents as mentioned in note 11, pages 5 to 13.

[19]Agreement between Canada and the United States providing for the development of Navigation and Power in the Great Lakes-St. Lawrence Basin, pages 1-9 of Correspondence and Documents relating to the Great Lakes-St. Lawrence Basin Development (King's Printer, Ottawa, 1941).

developed by means of a Controlled Single Stage Project, estimated to produce 2,200,000 horsepower which will be divided equally between the two countries.

(d) Preservation of the scenic splendor of Niagara Falls is to be assured, together with increased utilization of power at the Falls.

(e) The situation in regard to the Chicago diversion is to be stabilized.

(f) Waters diverted into the Great Lakes System from other watersheds may be utilized for power purposes by the country making the diversion.

In an article in the Canadian Pacific Railway magazine of August 1941, Mr. P. C. Armstrong has ably described the physical changes to occur on the Canadian side:

> "The Agreement simply provides that the two governments will jointly construct the waterway from Lake Ontario to Montreal. The present canals are to be abandoned and dams are to be placed at the foot of the Long Sault Rapids. From the Canadian shore, between Moulinette and Dickinson Landing—a little west of the upper end of the present Cornwall Canal—dams are to be built to Shook Island, from there to Barnhart Island, and from Barnhart Island to the United States shore—a little east of Massena. Two great power houses are to be built, one on the Canadian and one on the United States side. The river is to be backed up so as to make slack water everywhere west of Barnhart Island. This cuts out the need for the Gallop Canal between Cardinal and Iroquois, the Morrisburg Canal, the Farrans Point Canal and the upper end of the Cornwall Canal. All this will be replaced by dredging of the river west of the new dams, where necessary, and by locks bypassing the new dams.
>
> "There will be a great alteration in the foreshore on the Canadian side above the dam. The Canadian National Railways main line will have to be diverted for a considerable stretch near Morrisburg. The Montreal-Toronto highway will also have to be re-located. Much of the villages of Morrisburg and Iroquois, as well as many of the historic farm houses, churches, cemeteries, etc., on the Canadian shore, will have to be abandoned or re-located. The Ontario Hydro-Electric Power Commission will operate the Canadian power house and one of the graves to be moved is that of Sir James Whitney, Premier of Ontario when the Hydro was established. There will be little damage on the United States side, in view of the fact that the shore is higher there.
>
> "Below the dam at Barnhart Island the river channels will be deepened and improved where necessary, until we come to the foot of Lake St. Francis. At that point the existing Soulanges Canal is to be abandoned for navigation and the new canal of the Beau-

harnois Power Company will be provided with locks and made the main navigation channel. Through Lake St. Louis the river will be deepened and improved where necessary, and below Lachine a new canal will be built along the south shore of Montreal Island—cutting across one corner of it to deep water in Montreal harbor."[20]

Engineering Estimate of Cost

The total cost of the undertaking, including the work already completed, according to evidence of Brig.-Gen. Robins, Corps of Engineers, U. S. Army, before the Committee on Rivers and Harbors, United States House of Representatives, is estimated to be $579,252,000.[21] Of this amount, $277,090,000 is allocated to Canada and $302,162,000 to the United States. Canada is given credit for $132,672,000 already spent on the Welland Ship Canal and the United States $17,105,485 for expenditures on improvements to navigation in the Great Lakes.

Accordingly, the total cost to complete the power and navigation project as outlined in the agreement is estimated at $429,474,515, including $200,000,000 for the power phase, of which the Dominion will be required to provide $144,418,000 and the United States $285,056,515. These estimates include 25% for engineering and contingencies and approximately $10,000,000 for the deepening of harbors, but provide nothing for interest during construction, additional aids to navigation, maintenance or amortization of the facilities.

Ontario Will Acquire Power Works

Under the provisions of the agreement with the Province of Ontario signed concurrently, the Dominion agrees to transfer title to the power works and lands upon which they are built in consideration of the payment by Ontario of $64,125,000 over a ten-year period without interest, commencing with an initial instalment of $20,000,000 one year after power is developed and sold, or two years after completion of the power works, whichever is the earlier. The Province is further obligated to provide certain power machinery and equipment estimated to cost slightly over $25,000,000. The net cost to the Dominion of Canada upon the completion of the project and the payments by Ontario is estimated by Mr. A. A. Berle[22] to be somewhat less than $50,000,000.

A somewhat similar agreement has been entered into by the United

[20] *Canadian Pacific Railway Magazine*, August, 1941.

[21] Hearings before the Committee on Rivers and Harbors, House of Representatives, 77th Congress, First Session, on the subject of the Improvement of the Great Lakes-St. Lawrence Seaway and Power Project (U. S. Government Printing Office, June 19, 1941).

[22] *Ibid.*

States Government and the Power Authority of the State of New York by virtue of which title to the power works on the American side and to the power developed at that point will be vested in the Authority in consideration of a payment of $93,300,000 by the latter.

Work May Be Deferred

Two clauses in the international agreement are of particular significance to Canadians:

ARTICLE II[23]

"The Government of Canada agrees:

(b) to complete not later than December 31, 1948, the essential Canadian links in the deep waterway, including the necessary deepening of the new Welland Ship Canal and the construction of canals and other works to provide the necessary depth in the Canadian section of the St. Lawrence provided that, if the continuance of war conditions or the requirements of defence justify a modification of the period within which such works shall be completed, the Governments may, by exchange of notes, arrange to defer or expedite their completion as circumstances may require.

ARTICLE III[23]

"The Government of the United States of America agrees:

(b) to provide, as required by the progress of the works, funds for the construction, including design and supervision, of all works in the International Rapids Section, except (1) machinery and equipment for the development of power, and (2) works required for rehabilitation on the Canadian side of the International Boundary."

As a consequence of these clauses the United States is obligated to advance the funds for the major portion of the work—that in the International Rapids Section—and the Dominion is under no compulsion to complete its portion of the work in the Canadian territory before December 31, 1948.

Brig.-Gen. Robins is of the opinion that three working seasons—May to December—would be necessary to complete the project—that is, assuming that work might commence in May, 1942, it would terminate December 31, 1944. Delivery of power would not be possible, however, before 1945.

This, then, is the agreement the Dominion of Canada is requested to ratify, involving participation in possibly the outstanding engineering

[23]Cf. No. 19.
[23]Cf. No. 19.

feat of all time. Further consideration will be given to the economic aspects of the enterprise as they affect Canada, having regard to the arguments advanced for the project.

* * *

The Official Argument for the Seaway

Having regard to the initiation of the present negotiations by Washington, it is natural that the urgings of the Roosevelt Administration in behalf of the seaway should be more vigorous than those of Ottawa. The following letter forwarded by the President to the House of Representatives in support of the agreement is possibly the best available summary of the official American attitude:

"To the Congress of the United States:

"I recommend authorization of construction of the St. Lawrence Seaway and Power Project, pursuant to the agreement of March 19, 1941, with Canada, as an integral part of the joint defence of the North American Continent.

"Production and more production is the keynote of our all-out race for national defence. Electric power and transportation are limiting factors in the production of planes, guns, tanks and ships.

"The enemies of democracy are developing every hydro-electric resource and every waterway from Norway to the Dardanelles. Are we to allow this continent to be outmatched because shortsighted interests oppose the development of one of our greatest resources?

"Your action on this project will either make available or withhold 2,200,000 horsepower of low-cost electric power for the joint defence of North America.

"Your action on this project will either open or keep bottled up one of the greatest transportation resources ever offered the people.

"Both countries need the power. Both face power shortages which threaten to grow more serious as the demands of the defence program multiply with almost incredible rapidity.

"Let us remember that it takes tens of thousands of kilowatt-hours of electricity to produce the materials that go into a single airplane. Our present aluminum program alone calls for more than ten billion K.W.H. a year. It is constantly expanding with the need for more planes to outstrip the aggressors.

"Steam-power-plant construction offers no substitute for St. Lawrence power. No steam plants can provide the large blocks of low-cost electric energy required for certain essential defence industries. Furthermore, we are going to need all our capacity to

produce steam-power-plant equipment to meet the tremendous demands which are growing in other parts of the country and to build power installations to drive our merchant and naval vessels.

"Our defence production is a gigantic assembly line. Transportation is its conveyor belt. If raw materials cannot flow freely to our great industrial plants and the products cannot move continuously to the front, defence breaks down. Bottlenecks in transportation are as serious as shortages of power.

"Expanding production is going to burden the railroads to the limit. We are expanding their rolling stock as fast as we can but even the present orders for new cars and locomotives are competing for manufacturing capacity which could otherwise produce tanks and other items of heavy armament.

"The seaway will help prevent transportation bottlenecks. It will provide a great highway to and from important defence-production areas. It will cut by more than a thousand miles the stretch of dangerous open water which must be travelled by supplies to Great Britain and strategic North Atlantic bases. It will increase our capacity to build ships.

"The Great Lakes today hold many shipways and dry docks, as well as resources of men and materials for shipbuilding. They are bottled up because we have delayed completing the seaway. If we start the seaway now scores of additional merchant ships may be built in coastal yards freed by transferring a portion of the longer-term naval program to the Great Lakes.

"The St. Lawrence Project must be expedited. No comparable shipbuilding and transportation facilities can be made available in the time required to construct this project.

"In dealing with this present emergency, too many people have underestimated the degree to which our facilities will be taxed. We cannot afford to make any more mistakes of that kind.

"I am advised that we can build the St. Lawrence Project in four years. Under emergency pressure it may be completed in less time. I should like to agree with the people who say that the country's danger will be over sooner than that. But the course of world events gives no such assurance, and we have no right to take chances with the national safety.

"I know of no single project of this nature more important to this country's future in peace or war. Its authorization will demonstrate to the enemies of democracy that, however long the effort, we intend to outstrip them in the race of production. In the modern world that race determines the rise and fall of nations.

"I hope that authorization will not be delayed."[24]

[24]House of Representatives, Document No. 245, 77th Congress, First Session.

It will be seen that the arguments advanced for the undertaking by Mr. Roosevelt are, in reality, fourfold:

(1) power
(2) transportation
(3) shipbuilding
(4) continental defence.

In essence, however, they revolve about the latter—the need of wartime industry for additional electric energy and the possibility of constructing merchant and naval vessels of deep draft in shipyards located on the Great Lakes.

Canadian Prime Minister's Attitude

The attitude of the Rt. Hon. W. L. Mackenzie King has been much more restrained. Excerpts from a letter to the United States Minister to Canada, dated March 5, 1941, are rather typical of the official Canadian opinion—almost passive:

> "The growing intensity of the war operations and the apprehension that still more serious perils will have to be faced in the very near future, necessitate the most careful examination of any proposed expenditure from the point of view of public need and in the light of war requirements.
>
> "In existing circumstances, the Canadian Government desires to know whether the Government of the United States is of the opinion, in view of the position in Canada, and, of course, the position in the United States as well, that the project as outlined in the State Department's proposals of 1936 and 1938, and under consideration since that time should now be proceeded with.
>
> "We have, of course, been fully aware of the desire of the Government of the United States to have a treaty or agreement respecting the St. Lawrence waterway concluded at as early a date as possible, and negotiations, which have been carried on more or less continuously for some time past, have had in mind the desire to arrive, at the earliest possible date, at terms of agreement which would be mutually advantageous. We are also aware of the pronouncements which have been made from time to time by the President, respecting the added emphasis given by the war to the importance alike of power and navigation developments in the Great Lakes-St. Lawrence Waterway Project. We are also duly appreciative of the agreement recently reached between our respective Governments, whereby the Province of Ontario has obtained the right to the immediate use of additional power at Niagara, and the diversion of the waters of the Ogoki and Long Lac Rivers into Lake Superior, in consideration of which authority was given for the immediate investigation by United States engi-

neers of the project in the international section of the St. Lawrence River in Ontario, in order to enable work of future development to proceed with the least possible delay, once an agreement between the two Governments, respecting the St. Lawrence development was concluded.

"We would naturally be inclined to view with favor power or navigation developments which the United States may deem necessary to the prosecution of measures calculated to aid Great Britain, Canada and other parts of the British Commonwealth of Nations in the present war, or to further the security of the United States itself against possible future events, which, at the moment, cannot be foreseen, but of which in times like the present full account must be taken. We realize that the Government of the United States will be as solicitous as our own Government to appraise the project at the present time in terms of its contribution to the efforts which are being put forward by our respective countries to preserve and to restore freedom.

"It is from this point of view that we would ask that the St. Lawrence Project be again reviewed by the Government of the United States before an agreement or treaty be finally entered into."[25]

In the light of the arguments which have been advanced in these official documents, as well as by certain other interests, it now remains to analyze the proposed undertaking from Canada's point of view. The remainder of this study concerns itself with that analysis.

* * *

Economic Aspects (Canada)—Costs

The expenditure of public funds may be justified economically only if the benefits to be obtained — present or future — exceed the outlay involved. In national affairs those benefits may be economic, social or military and admittedly the precise determination or measurement of benefits may be extremely difficult. Nevertheless, some approximation generally may be made upon the basis of certain criteria.

The present St. Lawrence Waterway Project, accordingly, resolves itself into a determination of whether the gains to be effected by the suggested improvements—and it is important to bear in mind that the question is not one of constructing a new seaway but rather of completing one now in existence—exceed the expenditure involved together with the losses to be sustained by competing channels of trans-

[25]Correspondence and Documents Relating to the Great Lakes-St. Lawrence Basin Development, pages 38 and 39 (King's Printer, Ottawa, 1941).

portation. In brief, will the proposed development lead to (1) the movement of traffic which cannot now move and which would desire to move, (2) substantial reductions in the cost of moving existing and potential traffic, (3) low cost power not obtainable elsewhere on a comparable basis, (4) material assistance in the national defence efforts of the United States and Canada—all of these in volume and degree sufficient to counterbalance the cost of effecting the improvements as well as any burdens to be sustained through the disruption of existing facilities of transportation?

War-Time Economics Affect Agreement

In time of war the problem of public expenditure is complicated by an additional factor which Dr. Pigou has defined as "whereas in normal times we are concerned with the amount of goods and services that a country can produce regularly while its citizens enjoy the normal amount of leisure, in war we are concerned rather with the amount it can squeeze out for immediate use in the actual processes of war." In other words, war economics, which assume that virtual or complete utilization of human, material and financial resources has been achieved, demand that any appropriation of funds from the national exchequer must be viewed from its contribution to the general war effort having regard to the diversion of men and materials it will necessitate. Any discussion of the economic aspects of the Agreement of March 19, 1941, must stress this aspect—the contribution of the undertaking to ultimate victory. Will the vast expenditure required to increase hydro-electric facilities, to increase shipyards on the Great Lakes for the construction of merchant and naval tonnage, and to permit the passage of ocean transport through the Great Lakes-St. Lawrence System — will these expenditures whose benefits cannot become effective for a number of years be of more value to continental defence and rearmament than an equivalent amount spent upon airplanes, tanks, guns, etc., now?

This study, as has been mentioned, confines itself to an examination of the economic consequences for the Dominion of Canada. In one respect this is unfortunate, since it makes more difficult the necessary perspective to view the project as it is—a coördinated international effort. Nevertheless, in view of the financial obligations to be assumed by the respective countries, it is of paramount importance that each analyze the proposals in the light of its own requirements and capabilities. Any analysis of the agreement also must be complicated by the inclusion in the proposals of a number of objectives—power, navigation, shipbuilding and national defence.

Canada's Financial Commitment

As has been pointed out,[26] the total financial commitment of the Dominion of Canada to effect completion of the project had been estimated at $144,418,000. Because of the credit given the Dominion for its work on the Welland Ship Canal of $132,672,000, the financial commitment of the United States was much larger at $285,056,515, although roughly the original cost allocations were divided equally.

The existence of the agreement with Ontario for the acquisition of the power facilities must be regarded as a further credit ultimately to Canada's undertaking. Accordingly, the net cost to the Dominion is officially estimated at from $43,000,000 to $50,000,000. The generous offer of the United States under Article III[27] of the Agreement to advance all funds required for the construction of works in the International Section with the exception of machinery and equipment in the Canadian powerhouse and rehabilitation work on the Canadian side has led many proponents to fall into the error of assuming that Canada's contribution for many years to come will be of negligible proportions.

Having regard to these factors and to the unqualified gratitude of Canadians for the magnificent assistance which is being given by the American Government and people to Great Britain particularly, but none the less to Canada—a sense of gratitude which has established a feeling of kinship between the two countries possibly unparalleled in history—there is naturally an apathy in this country toward any painstaking analysis of the project such as might occur in more normal times. In other words, when the Dominion is passing through the most perilous period in its history (a fact as yet not universally accepted in Canada) why risk the possibility of antagonizing the best friend in the world by scrutinizing carefully a proposal submitted by that neighbor? Despite the apparent logic of this line of reasoning, it is undoubtedly the attitude which the Congress of the United States would be most anxious that Canada shun. The fact that Congress has been prepared to utilize valuable time to conduct hearings on the agreement is testimony to the fact that it would prefer all interested parties to consider the proposal carefully.

Additional Costs Foreseen

It would appear, then, to be a fair question to ask—do Canada's commitments as set out in the agreement and as frequently interpreted tell the whole story? In the first place, as has been mentioned, the cost

[26]Cf. pages 24 to 26.
[27]Cf. page 26.

estimates prepared by the engineers include 25% for engineering and contingencies but nothing for interest during construction, additional aids to navigation required, maintenance of the facilities or their amortization, and but $10,000,000 for the deepening of harbors on the Great Lakes.

No major harbor on the Lakes is of sufficient depth to accommodate the type of vessel which it is claimed will utilize the seaway. Present depths are 25 feet or less, many under 22 feet. The Brookings Institute estimated in 1929[28] that a minimum expenditure of $25,000,000 per harbor for each of eight important American ports would be required and this figure was also cited by Senator Robert Wagner in the minority report of the Senate Foreign Relations Committee in 1933.[29] Mayor Holling in testifying before the Committee of Rivers and Harbors conducting hearings on the present agreement estimated the total cost of improvements required in the harbor of Buffalo alone at $46,890,000.

Harbour Expenditures Will Be Heavy

The problem of the deepening of port facilities is not merely one of dredging — it involves as well the very considerable expense of strengthening and underpinning piers and docks, breakwaters, grain elevators, etc. In Canadian ports such as Toronto, Port Arthur and Fort William, etc., the cost of new foundations for 5,000,000- and 10,000,000-bushel elevators would not only be substantial but a definite engineering problem in itself. At Montreal the rearrangement of the harbor occasioned by the new canal is going to be a major undertaking. The Lake Carriers' Association recognizes 23 Canadian ports as of major importance[30]—that is, they handle cargo tonnage of at least 100,000 tons per season, and unquestionably each one would feel obliged to secure the assistance of Parliament in deepening its harbor for the reception of the largest vessels.

Because of the time required to complete the project, interest during construction will be substantial. Even if it be assumed that construction can be completed within four years and that the funds be required on the average for only half this period, the interest charge at 3 to 3½% becomes 6 to 7% of the total expenditure. Were the project to contemplate the use of tolls upon completion, the problem of interest

[28]The St. Lawrence Navigation and Power Project (The Brookings Institute, Washington, 1929).

[29]Report of the Senate Committee on Foreign Relations on the Deep Waterway Treaty, February 21, 1933 (U. S. Government Printing Office, Washington).

[30]The Great Lakes (The Lake Carriers' Association, Cleveland, Ohio, 1938).

on the investment after termination of construction, maintenance and amortization of the works would not be serious. As it is, the investment is to constitute a dead-weight burden and the above-mentioned interest charges, amortization and maintenance over a fifty to sixty-year period even at 3% interest would double or treble the capital cost.

Engineering Difficulties Likely to Increase Cost

Although the layman finds it difficult to question estimates prepared by engineers after careful study, the engineers themselves concede that the project involves very difficult engineering problems because of the tremendous volume of water to be handled in the St. Lawrence — 230,000 to 250,000 cubic feet per second (approximately 100,000,000 gallons per minute). Closely allied to the problem is the speed of the current in the St. Lawrence. Unwatering, the customary practice in hydro-electric developments, is completely out of the question in this undertaking. Is it not possible that these problems may increase the cost substantially above the original estimates?

The project, moreover, is to be rushed to completion as a war measure. With the present problems of supply, difficulties in obtaining skilled labor, rising material costs, etc., it seems reasonable to suggest that the provision of 25% for engineering and contingencies may prove very inadequate. Certainly the experience in similar undertakings in the past leads the layman to question the ability to remain within the estimates, particularly in a period of war. The Welland Ship Canal ultimately cost $128,000,000 rather than an estimated $50,000,000; the Panama Canal $375,000,000 instead of $160,000,000; the Chicago Drainage Canal $53,000,000 rather than $16,000,000; and the Suez $80,000,000 rather than $30,000,000.

Having regard to these factors, several competent students[31] of the project have dared to suggest that the total cost might be ultimately closer to a billion dollars than to the $500,000,000-odd mentioned by Brig.-Gen. Robins. Be that as it may, it appears difficult to the layman to convince himself that the estimates can be rigidly adhered to and that they represent the whole burden.

Dominion Will Bear Increase in Cost

Through the terms of the agreement between the Province of Ontario and the Dominion, the obligation of the Province has been fixed in money terms and, although payments are to extend over ten years, no

[31]Cf. B. D. Tallamy and T. M. Sedweek, *The St. Lawrence Seaway Project* (Niagara Frontier Planning Board, Buffalo, N.Y., 1940).

account has been taken of interest on the interim investment of the Federal Government in the power facilities. In reality, the Dominion is being called upon to finance the investment of the Province in the project to a substantial degree as well as to bear any increase in costs over the original estimates with respect to the works common to navigation and power and the hydro-electric facilities, to be assumed by the Hydro-Electric Power Commission of Ontario. It has been argued in certain quarters that the undertaking of the United States to advance funds for the construction of all work in the international section, except machinery and equipment in the Canadian generating plant and the cost of rehabilitation on the Canadian side, relieve the Dominion of the problems of financing the project during the present period of strain imposed by World War II. The agreement, however, is silent as to the "modus operandi." Mr. Berle pointed out to the Committee on Harbors and Rivers that the State Department were unhesitating in denying that the project came within the scope of the "Lease-Lend Measure."

If this be so, and having regard to the recent history of Canadian-American relations, it is likely that the Dominion will seek to provide a substantial portion, if not all, of the expenditures allocated to her. The avowed policy of the Bank of Canada for a number of years has been to reduce indebtedness in the United States, to restrain the creation of further obligations in that market, and since September 15, 1939, through the operations of the Foreign Exchange Control Board, to actually ration the available supply of American dollar credits, be they currency, securities or other investments.

Canada's Finance Is Already Burdened by War

Under these circumstances, it is impossible to disregard the additional increment to Canada's financial problems already overwhelmingly increased by the necessities of war, to be imposed by the St. Lawrence Seaway. The magnitude of Canada's war effort in financial terms is frequently underestimated by the citizens of this country. The following paragraphs from the Monthly Review of the Bank of Nova Scotia afford in summary a noteworthy picture of the present situation:

> "The third war budget has been enacted. The third war loan has been subscribed. Twenty-two months have passed since the outbreak of war and in rough outline we can see the mounting scale of our financial requirements in 1942. The implications of that picture are reasonably clear. They spell the end of a period in which Canada has had both 'guns and butter' or, what is perhaps a better analogy, both 'guns and automobiles.' They mark the beginning of a time in which our standards of comfort and con-

venience must increasingly give precedence to the urgent needs of war.

"A glance at the budget estimates provides strong presumptive, if not conclusive, evidence of this fact. In the present fiscal year the Dominion Government requires about $2,650 millions. This is 75% more than the outlay of the past fiscal year and over three times as much as the largest annual expenditure during the last war . . . about $2,200 millions of this enormous total is for war purposes and is made up of direct war expenditures and of outlays for the purpose of financing Britain's deficit in Canadian dollars. The direct war expenditure is placed between $1,300 and $1,450 millions and assistance in financing British requirements in Canada is tentatively estimated at from $800 to $900 millions.

"Revenues are expected to cover about $1,400 millions of these requirements. The combined influence of the sharp increases in taxation and of the rising national income has lifted the estimate of revenues by 60% over last year and by almost 200% over the pre-war level. None the less, the amount which is being financed by loans is extremely large — roughly $1,250 millions. Toward meeting these additional cash requirements the Victory Loan has raised about $720 millions while the estimated receipts from war savings certificates and from the unemployment insurance plan and certain other government funds may account for a further amount in the neighborhood of $200 millions.

"When viewed in relation to the national income, these figures indicate a very substantial economic effort. In the present fiscal year the total outlays of the Dominion Government may exceed 40% of the national income. Outlays for war purposes may amount to somewhat over one-third of the national income, say about 35%, including both the Dominion's direct expenditures and its requirements for financial assistance to Britain. The Canadian proportion of around 35% is, of course, less than in Great Britain, where over 50% of the national income is being diverted toward the war. It is, however, at least as great as in Australia and substantially larger than the proportion of defence expenditures to national income in the United States."[32]

It must be recognized that the Minister of Finance has been careful to term the present estimates as minimum demands. Recently discussions have taken place with reference to the provision of actual financial gifts to the United Kingdom to replace at least in part the present system of advances.[33]

The significance of these facts in relation to the present undertaking to improve the waterway is simply — are the advantages to be gained from completing the project, economic and defensive, sufficient

[32]MONTHLY REVIEW, The Bank of Nova Scotia, June, 1941.

[33]Cf. FINANCIAL POST, August 9, 1941.

to compensate for the additional load of at least $144,000,000 and likely much more to be added to the debt and taxation structure of a country already heavily burdened and destined to be subjected to much greater sacrifices in the near future?

Heavy Indirect Costs Are Likely

In this survey of costs no account has been taken of those of an indirect character or possible losses to be sustained by existing systems. These will be discussed in later pages in connection with other phases of the undertaking. Nor has any attention been paid to the equity of the division of costs agreed upon. It is well known that Canada receives no credit for the expenditures in improving the St. Lawrence from Montreal to the Gulf—an amount exceeding $80,000,000—and that the Dominion is expected to maintain this section at its own expense in future. Critics have stressed for years that the benefits to be obtained from the Great Lakes-St. Lawrence improvements naturally would accrue in larger measure to the United States than to this country. In the Minority Report of the National Advisory Committee submitted in 1928, Mr. Beaudry Leman pointed out:

> "It is easy to understand that results of this enterprise will benefit a population of 40,000,000 people, living in a country as immensely wealthy as the United States whilst in Canada the population served at the present time will not exceed 5,000,000 . . . The apportionment of expenditure—⅔ to the United States and ⅓ for Canada—would constitute a generous contribution on Canada's part."[34]

At the present time, such questions seem to be dwarfed by greater and more fundamental considerations. Accordingly, no attempt to criticize the general allocation of costs will be made in this study.

* * *

Economic Aspects (Canada)—Shipbuilding

In his message to Congress requesting ratification of the Agreement of March 19, 1941, President Roosevelt set forth the following as important reasons for the work:

> "The Great Lakes today hold many shipways and dry docks as well as resources of men and materials for shipbuilding. They are bottled up because we have delayed completing the seaway. If we start the seaway now, scores of additional merchant ships may

[34]St. Lawrence Waterway Project, Report of the Canadian National Advisory Committee (King's Printer, Ottawa, 1928).

be built in coastal yards freed by transferring a portion of the longer term naval program to the Great Lakes."[35]

Somewhat the same view was expressed by the President in a letter forwarded in December, 1940, to the Great Lakes Seaway and Power Conference at Detroit:

> "The United States needs this great land-locked sea as a secure haven in which to build ships and more ships in order to protect our trade and our shores . . . Shipyards on the Great Lakes, with access to the ocean, close to the sources of supply and labor, raw and finished materials, further removed from possible attack, may be a vital factor in successful defence of this continent. They will help to build the ships which will bring back commerce to the harbors of the Atlantic Coast ports."[36]

It is unnecessary to dwell upon the need of providing every possible facility for the construction of ship tonnage, merchant and naval, particularly the former. The staggering losses of merchantmen by Great Britain within the year ending June 30, 1941, and their implications in the ultimate course of the war are generally appreciated. In view of the undertaking of the United States to complete within the next few years the greatest shipbuilding program in the history of the world—a two-ocean navy as well as a merchant program embracing 850,000 tons in 1941, 1,700,000 tons in 1942 and 3,500,000 tons in 1943[37] —the interest of the President in the provision of shipbuilding facilities is understandable.

Canada's Shipbuilding Program

What of Canada's position? On June 11, 1941, the Hon. C. D. Howe informed the House of Commons:

> "A year ago Canada had converted a few smaller vessels to naval use, and ship contracts had been placed to the extent of about $50,000,000. Today of 80 corvettes on order, 59 have been launched. Of the 60 mine sweepers, 24 have been launched. Three merchant vessels have been converted into auxiliary cruisers, and 27 other boats have been converted to naval means. In addition, we are building 24 patrol vessels and 12 mine sweepers of a special type. Work is under way on a cargo vessel program, involving an expenditure of over $200,000,000. We have also in progress a substantial small boat program. Seventeen major shipyards and forty-five minor shipyards are occupied on this program. The

[35]House of Representatives, Document No. 245, 77th Congress, First Session (U. S. Government Printing Office, Washington).

[36]Cf. BUSINESS WEEK, page 20, March 15, 1941.

[37]Cf. FORTUNE, July, 1941, page 105.

major shipyards are being substantially enlarged to accommodate the cargo vessel program."[38]

Although the above program, with the exception of cargo vessels, is essentially one involving smaller craft, arrangements have been made recently to build in Canada several destroyers of the latest British type. In any event, the plans are exceedingly ambitious for the Dominion and destined to tax to the utmost the shipyards now available.

During World War I well over one million tons of shipping were constructed in yards located on the Great Lakes.[39] Much of this comprised smaller naval craft but at the same time extensive construction of merchant ships was undertaken. By building the vessels in halves with subsequent assembly on the seaboard, it was possible to produce freighters of the largest type in Great Lakes yards—a feat otherwise impossible because of the canals in the Great Lakes - St. Lawrence System.

Ships Are Now Built on Great Lakes

Since June, 1940, a rather similar policy has been adopted by the United States, except that the vessels too large for transshipment through the St. Lawrence canals have been floated down the Mississippi to be fitted out. In his testimony before the Committee on Rivers and Harbors the Hon. Frank Knox, Secretary of the Navy, stressed the importance of this technique:

> "The Maritime Commission, which has direct charge of this type of construction, has found a way, an ingenious way, to build a pretty good-sized ship in the Great Lakes. They build her save her upper works and take her down the Illinois and Mississippi water route to sea, finishing her at some point en route, so that every single power of productive capacity to be found in that region is now about to be employed under contract for the construction of merchant vessels."[40]

Canada's existing shipyards on the Great Lakes suitable for merchant ship construction are not numerous nor large by comparison with those of the United States. In an exhibit submitted to the Committee on Rivers and Harbors, Admiral George H. Rock showed them to be the following:

[38]House of Commons Debates, June 11, 1941 (King's Printer, Ottawa).

[39]Cf. BUSINESS WEEK, March 15, 1941, page 20.

[40]Hearings Before the Committee on Rivers and Harbors, House of Representatives, 77th Congress, First Session, on the Subject of the Improvement of the Great Lakes-St. Lawrence Seaway and Power Project (U. S. Government Printing Office, June 19, 1941), page 97.

Canadian Shipbuilding and Repair Yards on the Great Lakes

COLLINGWOOD SHIPYARDS, LTD., Collingwood, Ontario:
5 berthing docks (no dimensions)
2 drydocks:
518 feet by 56 feet at entrance
412 feet by 95 feet at entrance
Limiting conditions—16-foot draft

KINGSTON SHIPBUILDING CO., LTD., Kingston, Ontario:
2 building berths (no dimensions)
1 dry dock:
379 feet 6 inches by 55 feet
Limited to 16-foot draft

A. B. MCLEAN & SONS, Brock St. Dock., Sault Ste. Marie, Ont.:
Repair work only
1 dry dock:
112 feet length, width 49 feet 6 inches, depth 13 feet.

MIDLAND SHIPBUILDING CO., LTD., Midland, Ontario:
3 building berths—650-foot, 265-foot, 265-foot
PORT ARTHUR SHIPBUILDING CO., LTD., Port Arthur, Ontario:
2 building berths—650 feet long
1 dry dock—700 feet by 98 feet, and water over sill 16 feet.[41]

This table, of course, excludes the host of small yards which can be and are being employed in the fabrication of naval craft such as corvettes, mine sweepers, patrol vessels, crash boats, tenders, etc. On the American side of the Lakes the present shipways are much larger but still small by comparison with those located on the Atlantic and Pacific coasts.

Lock 17 in the Cornwall Canal is at present the controlling factor in the size of ships which may be taken through the Great Lakes-St. Lawrence System. With a bottom width of 43 feet 8 inches, and accommodating vessels of not over 255 feet length and 14 feet draft, the vessel which may be brought down in completed form from the Great Lakes to the sea is not a large one. Even destroyers (the British Tribal Class are 355 feet long, 36 feet wide and draw 9 feet of water) and submarines are excluded.

Present Facilities Are Adequate for War Needs

On the other hand, is this obstacle a serious deterrent? Cargo

[41] *Ibid*, page 164.

vessels, with the exception of the largest liners, and naval craft with the exception of battleships, aircraft carriers and the heaviest cruisers, can be brought down in halves and fitted out on the seaboard. Such a policy, moreover, is an extension of the technique of decentralization of production being followed so widely in this war together with the companion policy of subcontracting. Smaller vessels for which the present need is most urgent can be completely built on the Great Lakes.

Canada, for her part, plans no naval vessels larger than destroyers and the contemplated construction of cruisers, etc., in Great Lakes yards by the United States involves problems not widely appreciated. The procurement of armor-plate in this area, experienced marine engineering advice, and especially the provision of adequate skilled labor is most difficult and construction as well is radically different from that of commercial vessels and smaller craft. The seaway project of itself will not provide an additional supply of skilled labor.

> "In general . . . the Maritime Commission does not like to monkey with totally new units; it prefers to encourage the addition of plant capacity for old yards, as it is doing at the eastern and the Pacific Coast yards and at a couple of yards around Mobile Bay. The theory of expanding the old yards derives from a fear that new yards are an invitation to talent thefts from the older organizations."[42]

Canada's policy has been substantially the same.[43]

Having regard to these factors and to the urgent necessity of providing tonnage which can be constructed in yards on the Great Lakes, even if completion must take place in the Lower St. Lawrence or on the eastern coast, is Canada justified in regarding this official argument for the seaway very seriously—at least when it involves such a large financial commitment? The completion of the seaway must be far distant and the existing requirements can be met by the present facilities with the modifications utilized in World War I.

As for the United States, what if completion of the seaway should be delayed by engineering difficulties or shortages of labor and materials beyond December 31, 1944, as contemplated? Of what value would cruisers, etc., constructed on the lakes but bottled up above Cornwall be to the United States navy? If the shipbuilding program of this continent requires new inland yards, close to supplies of steel, power, materials and labor—why not construct them on the St. Lawrence River below Quebec City?

[42] *Ships for This War*, page 114, FORTUNE, July, 1941.

[43] Cf. page 45.

Economic Aspects (Canada)—Hydro-Electric Power

The inclusion of the power development as an integral phase of the St. Lawrence Seaway has frequently served to create confusion. To some, the argument seems to be — we are proceeding with a gigantic waterway in any event; why not develop hydro-electric energy at the same time? Others reverse this argument, contending that inasmuch as a large scale hydro-electric generating plant is a necessity on the St. Lawrence, it would be folly to oppose the navigational improvements, since dams would be required for power purposes.

In the final analysis, justification for the expenditure of approximately $200,000,000 in the International Rapids Section to permit the generation of 2,200,000 horsepower, half for the Dominion and half for the United States, must rest upon three fundamental propositions:

1. that a shortage of power within economical range of transmission of the proposed development now exists or threatens to exist in the near future.
2. that energy can be made available from this source, if not earlier, at least no later than it can be available from other sources.
3. that the cost of power to be produced by the proposed development will be at least as cheap, if not .cheaper than that obtainable elsewhere.

It will be recalled that President Roosevelt in requesting Congress for ratification of the present seaway agreement emphasized very strongly the power aspect in pointing out the advantages of the undertaking:

> "Electric power and transportation are limiting factors in the production of planes, guns, tanks and ships . . . Both countries need the power. Both face power shortages which threaten to grow more serious as the demands of the defence program multiply with almost incredible rapidity . . . Steam-power-plant construction offers no substitute for St. Lawrence power. No steam plants can provide the large blocks of low-cost electric energy required for certain essential defence industries."[44]

Power Situation in Ontario and Quebec

Inasmuch as this study confines itself to the Canadian implications of the agreement, it will be necessary to restrict examination of the

[44]Cf. No. 24.

power phase largely to those implications. In the course of the analysis, however, certain questions will be raised incidentally for consideration by American advocates of the project. It must be recognized as well that since the practical range of transmission of International Rapids Section power in Canada would be limited essentially to the Provinces of Ontario and Quebec, this discussion must be limited primarily to the situations in those provinces. Because of the present interchange of power between the two, this course appears somewhat more desirable than an analysis based solely upon conditions in Ontario, which by agreement with the Dominion has covenanted to purchase the hydro-electric facilities and to absorb the power upon completion of the project.

The analyst of the Canadian power situation is impressed repeatedly with the absence of unanimity among professional engineers as to the adequacy of the present generating facilities to meet future needs and with the radical changes which occur from time to time in the public statements of such experts. Admittedly, the profound alterations in planning the war effort of this country and its requirements upon industry, induced by the fall of France, render many of these phenomena plausible. But the frequent changes and forecasts of power needs, etc., do tend to establish doubt in the public mind as to the soundness of the opinions expressed.

By way of illustration, the Lieutenant-Governor of Ontario, on June 10, 1940, in the Speech from the Throne, said:

> "Ontario has adequate power resources for any present war-time need and plans that will take care of possible future demands are under way."[45]

As late as April 11, 1940, Dr. Hogg, Chairman of the Hydro-Electric Power Commission of Ontario, emphasized to the Empire Club of Canada in Toronto, while discussing the St. Lawrence Seaway:

> "It is quite evident that this development cannot be classed as a war measure, for even if it were undertaken tomorrow if would be six or seven years before it could be of use. Yet the project is persistently misrepresented as a war measure, which, far from helping, would actually handicap our work . . . There are substantial power resources on the Ottawa River which can probably be made available more quickly than the St. Lawrence."[46]

Ontario Hydro Foresees No Power Shortage

The annual report of the Hydro-Electric Power Commission of Ontario for the year ending October 31, 1940, written some time after

[45] THE LONDON FREE PRESS, January 10, 1940.
[46] *Ibid*, April 11, 1940.

the full implications of Canada's accelerated munitions program and the policy of industrial plant expansion had been generally appreciated, made no mention of any serious, actual or threatened power shortage. The report went on to say:

> "The beginning of the fiscal year in November 1939 found the Commission in a favorable position with respect to power supplies and the promise then made that Hydro could, during 1940, meet a greatly increased demand for power for industries manufacturing munitions and war supplies has been satisfactorily kept without undue difficulty . . . Continuous attention has, therefore, been paid by the Commission to the problem of insuring that the power resources of Ontario shall continue to be ample to service all war demands."[47]

Mention of the St. Lawrence Seaway in the report was brief, but the following comment is possibly pertinent:

> "It is evident that changing world conditions must profoundly modify many of the views previously held respecting this great undertaking."[48]

The abrupt change of attitude on the part of the Province of Ontario toward the seaway during 1940 expressed in public support and eventually in negotiations culminating in the execution of an agreement with the Dominion respecting the power facilities, naturally has been disconcerting to the layman who had been led to believe for a period of several years that Ontario's supply of power was adequate for any conceivable eventuality — if not an overwhelming burden at times. It is not the purpose of this study to direct attention to errors of judgment made in the past. No one is entirely blameless in that respect and the present objective is to plan effectively and vigorously for the future.

New Hydro Developments in Ontario

What of the present power situation in Ontario? During July 1941 Mr. A. D. Ellwood of The Financial Post conducted a survey contained in the issue of this publication of July 12. Certain paragraphs taken from the article are of interest:

> "Ontario's Hydro-Electric Power Commission is confident that it will be able to meet the 1941 peak power this fall. But it will require every horsepower that can be scraped together. The Financial Post is informed:

[47]The Report of the Hydro-Electric Power Commission of Ontario for the year ending October 31, 1940, pages v and vi.

[48]*Ibid*, pages vi and vii.

"Take the largest unit of Ontario Hydro, its Niagara System. Estimates show that this system will have available 1.7 million h.p. for its late fall peak this year. Last year the peak demand—an all-time record—required 1.57 million h.p. This included 220,000 h.p. sold as secondary power.

"This year, to meet the expected peak will require the use as primary power of all power now sold as secondary. In addition, power now exported at Niagara will be held in Canada with the exception of two blocks totalling 110,000 h.p. which are sold under firm long-term contract by Ontario Power Co. and Canadian Niagara Power to war users in the United States.

"Ontario Hydro officials, however, are confident that there will be no shortage, nor any rationing of electric power necessary, although admitting that the margin will be slim.

"In the Eastern Ontario system peak demand for power in May was up 20,000 h.p. from the same month a year ago. The Eastern Ontario system had about another 20,000 h.p. of power available with which to meet the fall and winter peak demand. This is expected to be sufficient.

"A year from now Eastern Ontario will have the Barrett Chute development on the Madawaska River, now under construction, starting to deliver its 54,000 h.p. and there should be ample power available to meet anticipated demands in 1942.

"The Georgian Bay system is now running about 10,000 h.p. ahead of this time a year ago and has no reserves. Any variations in demand are handled by interconnection with the Niagara system. In November, however, an additional 10,000 h.p. will be ready for delivery from the Big Eddy development on the Musquash River.

"Throughout Ontario new war industries are nearing completion and some of them will need a lot of power. Ontario Hydro's estimates showing that it will be able to meet power demands this fall include that expected from these new plants. If all of them come into production strictly on schedule, Ontario may be 10,000 h.p. short at peak demand, but this could be met without serious inconvenience. Moreover, experience suggests the strong likelihood that some war plants scheduled to open in November or December may be delayed by not getting their equipment on time and thus ease over the extreme peak in another way.

"In any case actual peak is only for a few minutes each day, during late November and early December. But Ontario has no power to spare and supplying all anticipated demands when the days get short this fall and war industries are progressively stepping up their requirements will leave the province dangerously short and with practically no reserves.

"On November 1 this year Ontario Hydro will have available

an additional 20,000 h.p. from Maclaren-Quebec Power Co. and 50,000 h.p. from Beauharnois Light, Heat and Power Co. This additional 70,000 h.p. will all be required at once and used as primary power.

"Authority secured from the United States to divert an additional 8,000 cubic feet per second of water at Niagara last year was an important factor in enabling Ontario Hydro to satisfy power demands. This included 5,000 c.f.s. that Ontario is to return when the Ogoki-Long Lac diversion project is completed, probably some time in 1943."[49]

Analysis of Quebec Power Situation

The position in Quebec was analyzed by The Financial Post later in the same month and several of the paragraphs of the article are reproduced herewith:

"Shop windows in Quebec's urban centres might be dimmed this coming winter. Advertising signs might be lightless. Office hours might be staggered. These and other moves may be necessary to lighten the power load on the tramway system, if the power shortage which H. J. Symington, Dominion Power Controller, fears should be realized.

"On the basis of the present expansion of aluminum smelting facilities and on the assumption the water supply will not be any better than it was in 1940, Mr. Symington estimates the supply of power will be 500 million kilowatt hours short of requirements.

"Taken by itself this figure might lead to the belief that Quebec faces a serious shortage of power. Such is not the case. While 500 million k.w.h. of energy represents a lot of energy—still it is only 4% of present consumption.

"With machine capacity in the power industry far greater than actually required this prospective shortage of 4% could be picked up quite easily provided water is available.

"Last year saw low water conditions in the province and conditions during the first five months of this year were even less favorable. Recently several good rainfalls have brought water storage back to the 1940 level.

"Given a series of good rainfalls between now and the end of the year, Quebec power supply situation could undergo a marked change for the better and there would be no talk of a shortage.

"The problem facing the power controller is to anticipate what the situation might be if these rains do not materialize. The estimate of a possible 500 million k.w.h. shortage was predicted on a water supply no better than in 1940.

[49]THE FINANCIAL POST, July 12, 1941.

"There is by no means unanimity of opinion in the Quebec power industry on the likelihood of a shortage. Some operators are quite confident all requirements can be taken care of with water conditions at the 1940 level. Others foresee a tightness of supply and some an actual shortage.

"The warning of the power controller of possible restriction on the use of electricity for commercial and domestic purposes was precautionary. At this stage it is impossible accurately to estimate the power supply available next winter.

"The power situation hinges around the extent of operations at the smelting plants of the Aluminum Co. of Canada.

"With the pot room capacity scheduled for completion the end of the year it will be difficult, according to one authority, to meet the power demands with the present water supply.

"The company has gone ahead installing pot rooms with the idea that productive facilities will be available to utilize all the power that might be produced under favorable water conditions.

"The problem facing the power controller and others is how to make up the 500 million k.w.h. in the event water conditions are unfavorable.

"Quebec is the largest producer of hydro-electric energy in the Dominion. It is also the largest user of energy. While 500 million k.w.h. represents only 4% of consumption, it will not be an easy matter to pick up that amount of electricity for use in the aluminum plants.

"At present less than 150 customers use 86% of the total primary energy sold in the province and take over 80% of the total demand.

"These industrial customers are nearly all doing vital work."[50]

New Power Sources

From this evidence it would appear that steps must be taken to develop new power sources to meet the steadily growing war demands which increased firm power consumption in Canada during the first six months of 1941 approximately 20% over the comparable period of 1940. As total consumption, primary and secondary, increased only 5%, much of the expansion in primary demand was met by the withdrawal of power formerly sold as secondary. The margin of secondary power is being gradually reduced and the impact of further increases in primary demand hence will be aggravated.

The question with respect to power to developments in Ontario and Quebec then becomes—when and where? In 1942 Ontario will secure

[50]THE FINANCIAL POST, July 26, 1941.

an additional 25,000 horsepower from Beauharnois (a similar amount is to be taken in 1943) and has arranged with MacLaren-Quebec for an additional 25,000 horsepower beyond the maximum set out in the 1937 contract. The Barrett-Chute development on the Madawaska River is to come into production in 1942 with a capacity of 54,000 horsepower. The total planned increment in Ontario for 1942 is thus well over 100,000 horsepower.[51]

Interconnection of the various systems of the Ontario Hydro, excluding the Northern Ontario properties, is proving of great benefit in reducing the reserves of energy which normally would be provided and in permitting more effective use of generating facilities. In the annual report for 1940 Dr. Hogg emphasized the value of this feature in the following paragraph:

> "These frequency changers and their associated tie-in transmission lines are of sufficient capacity to permit interchange of substantial blocks of power from one system to another so that diversity in the time of peak load, fluctuating energy requirements, or variations in power supplies available from different power plants, may all be coördinated to smooth out the demand curve to the advantage of the inter-connected systems."[52]

What further power sites are capable of early development in the Province of Ontario? The report of the Hydro-Electric Power Commission for 1940 points out that the DeCew Falls plant on the Welland Canal may be extended and reconstructed to provide 200,000 horsepower, instead of 50,000 at the present time. On the Madawaska River an additional supply of 150,000 horsepower may be obtained. The Ogoki River diversion to be completed in 1943

> "will add about 90,000 horsepower to the potential power of the Nipigon River, of which about 50,000 horsepower can be made readily available to existing plants of the Hydro-Electric Power Commission by extensions at Cameron Falls and Alexander Landing. The Long Lake diversion will permit the development on the Aguasabon or Black River of about 20.000 horsepower. Passing through the outlet of Lake Superior at Sault Ste. Marie, the combined diversion of 5.000 c.f.s. will permit the development of 9,000 . . . If this 5.000 c.f.s. should be utilized in a second full-head development at Queenston it would provide 150,000 horsepower."[53]

[51]For the figures in this paragraph with reference to deliveries in 1942, Cf. The Financial Post Corporation Service cards for the companies concerned and the report of the H.E.P.C. for 1940.

[52]Cf. Note 47, page vii.

[53]Votes and Proceedings of the House of Commons of Canada, March 21, 1941 (King's Printer, Ottawa).

Quebec's Potential Power Development

The analyst finds it somewhat more difficult to secure unanimity among authorities as to the potential hydro-electric resources of the Province of Quebec. It would appear, however, that the potentialities based upon a number of engineering reports prepared by government and private engineers might be conservatively estimated at least as follows:

OTTAWA RIVER

Upper Reaches—500,000 horsepower (150,000 quickly available)

Carillon—400,000 horsepower (available within 2 years)

ST. MAURICE RIVER

A number of sites—1,000,000 horsepower

BEAUHARNOIS

700,000 horsepower, partially available within 2 to 3 years.

These estimates take no account of possible developments on the Gatineau, Lievre or Saguenay Rivers where there are also reported to be potential developments of substantial size. Some authorities estimate that at least five million horsepower, all within easy transmission distance of the St. Lawrence, could be developed more quickly than the St. Lawrence power.

In every instance the authorities appear to agree that these developments in Ontario and Quebec could be effective within three years at a maximum and several within a considerably shorter period. The estimates, too, are much below those shown for potential power resources by the Canada Year Book, which includes many sites at present commercially impracticable.

Advantages of Progressive Development

Having regard to this evidence, it seems difficult to defend the second proposition advanced at the beginning of this section. If a power shortage should exist before 1945, the St. Lawrence development is going to be valueless in meeting it, whereas with a policy of progressive development of other resources, increasing demands should be possible of satisfaction as they occur. If the war should end before 1945 serious problems may arise as to the power undertaking contemplated in the agreement of 1941. In the inevitable aftermath, is Ontario going to feel kindly disposed toward finding a market for 1,100,000 horsepower? Certain critics dare to suggest that the arrangement between the Dominion and the Province then might go the way of the

Quebec power contracts in 1937. It is true that the development of other facilities will be beset by the same problems in the period of reconstruction but under a program of gradual utilization of resources the shock at any one time is certain to be much less severe.

Comparison of Power Costs

With reference to the third proposition which concerns itself with the comparative cost of the energy to be produced by the undertaking, it will be recalled that Brig.-Gen. Robins estimated the cost of the power facilities in the International Rapids Section at $200,000,000.[54] With the contemplated installation of 1,100,000 horsepower on the Canadian side, this represents a Canadian capital investment per horsepower of approximately $91 ($100,000,000 divided by 1,100,000). The comparable figure for the Queenston plant of the Hydro-Electric Power Commission of Ontario which has an installed capacity of 500,000 horsepower is $154 per horsepower, according to the latest annual report. In this instance the relatively high investment may be attributed partly to the period of construction but more particularly to the necessity of constructing a long and costly power canal. The capital investment per horsepower for the Chats Falls plant of the Hydro on the Ottawa River, which has an installed capacity of 108,000 horsepower, is but $66.[55] Comparisons with the plants of privately owned utilities in Quebec are difficult because the plant item shown in public statements generally includes intangibles and fails to exclude transmission lines, etc. Security analysts, however, generally accept $75 to $100 per installed horsepower as a reasonable figure for an efficient hydro-electric development.

Assuming that the allocation of costs between navigation and power in the St. Lawrence undertaking is equitable — a point disputed by economists — and assuming that the ultimate costs will not exceed the estimates — a fact open to grave question as already emphasized — the cost of the energy to be developed in the International Rapids Section, as estimated, appears relatively reasonable. When it is considered, however, that most authorities agree that the other undeveloped resources mentioned in this section can be brought into production at no greater estimated cost per horsepower, and are willing to be much more definite in their assurances because of the more limited engineering problems to be encountered, the third proposition advanced at the commencement of this section appears to have little validity. Accordingly, the entire power phase of the undertaking, for its own part,

[54]Cf. page 24.

[55]This plant is operated jointly with the Ottawa Valley Power Company, which has a similar installation in the Quebec half of the power house.

appears difficult to justify from the Canadian point of view in the present emergency.

Possibilities of Steam Power Generation

It is possibly not out of place to suggest that consideration might be given by both the Provinces of Quebec and Ontario to the construction of some steam generating plants during the present conflict. Such plants, capable of speedier construction and at a much lower initial cost than hydro-electric stations, would be of value in meeting peak and unexpected requirements. Located close to the centres of war production they would obviate the necessity of long transmission lines and because of the lower capital investment would constitute much less a problem after the war when power demands undoubtedly will decline rapidly, at least for a time. Costs of generation by steam have been reduced markedly since 1900 — plants of the most modern type now consume less than one pound of coal per k.w., whereas in 1902 they consumed 6.41 pounds—so markedly, in fact, that the newer installations compare quite favorably with hydro-electric facilities. In Canada the only problem would be supplies of coal, with the attendant foreign exchange and transportation aspects in addition to its cost.

* * *

Economic Aspects (Canada)—Navigation

The genesis of the Great Lakes-St. Lawrence Waterway was in the navigational aspect and came first from Canadian sources. With the development of the West, a movement began for reductions in the rates for transporting grain to the seaboard and in the costs of imports. Easterners in Canada were more interested in gaining entry by reciprocity to American markets and in securing a share of the profitable coastal trade of the United States. More recently the navigational phase would seem to have been relegated to the background with the growth of the power, shipbuilding and defence arguments, but to many proponents it is still the paramount consideration.

President Roosevelt stated in very aggressive terms in his recent letter to Congress the modern transportation arguments for the seaway:

> "Your action on this project will either open or keep bottled up one of the greatest transportation resources ever offered a people.
>
> "Our defence production is a gigantic assembly line. Transportation is its conveyer belt . . . Bottlenecks in transportation are as serious as shortages of power.

"The seaway will help prevent transportation bottlenecks. It will provide a great highway to and from important defence-production areas. It will cut by more than a thousand miles the stretch of dangerous open water which must be travelled by supplies to Great Britain and strategic North Atlantic bases."[56]

Canals Will Not Create Traffic

The attitude of informed opinion towards the project was possibly best expressed by Sir Edward Beatty, the eminent spokesman for Canadian business, in his address to the annual meeting of the Canadian Pacific Railway in May, 1941:

"Long experience in transportation leads the management of your Company to believe that no important advantages, in connection with the movement of traffic, can result from this great project.

"The existing waterway has proved to be entirely adequate for the business which is now offering, and with minor improvements could be made entirely adequate for any that can presently be foreseen. The great volume of traffic on the Great Lakes is North American in both origin and destination, and it is but wishful thinking to assume that any important new traffic of this class can be created by merely enlarging the St. Lawrence canals. Should the canals be enlarged to the extent contemplated in the plan, it is probable that traffic would be diverted from existing railway systems. The net effect of this diversion would be to impose an additional burden on this country which is already beset with serious problems arising from duplication and excess transportation facilities.

"The investments of the United States and Dominion of Canada in the existing St. Lawrence waterways are already substantial. Notwithstanding this fact, toll-free navigation, a condition almost unique on similar waterways throughout the world, continues to be permitted over this route, to the detriment of competing agencies of transportation. The revival of the plan, therefore, leads me to urge strongly that the fundamental need, in connection with our waterways, is not large expenditures for their improvement, in excess of the needs of the traffic offering, but the adoption, in negotiation with the Government of the United States, of a plan by which the traffic now using the canals will be taxed sufficiently to free the Dominion Treasury from at least a part of the heavy burden which has resulted from our great expenditures on waterways in the past."[57]

Many analyses of the transportation aspects of the St. Lawrence

[56]Cf. pages 27 and 28.

[57]Report of Proceedings at the Annual General Meeting of Shareholders, May 7, 1941, Canadian Pacific Railway Co.

Seaway have been undertaken. Some have been exceedingly painstaking and comprehensive[58]—others tinged heavily with partisanship, emotionalism or sectionalism. The reader of certain of these as well as of some of the evidence presented the various committees which have scrutinized the undertaking is struck by the attention paid so frequently to seeming trivialities—fog conditions on the St. Lawrence, ice, accidents in the canals, the necessity of carrying interpreters on ocean ships using the waterway, wage rates on lake vessels as compared with those on the ocean, pilotage, tugs for berthing, etc. So many writers appear to forget that navigation does exist on the St. Lawrence and has existed for many years and that ocean ships, of small size, have utilized the present waterway.

Character of Great Lakes Traffic

With the presence in eastern and central United States and Canada of one of the greatest centres of industrial development in the world, located close to the Great Lakes-St. Lawrence System, the dream of a great inland waterway is easy to understand. At its western approaches the system taps the largest field of iron ore known to man as well as the most important agricultural area in the world. Traffic is bound to pass through the Great Lakes and St. Lawrence and backward indeed would be any person who would oppose the utilization of this resource. The question is not whether there should be a St. Lawrence seaway but rather what form that seaway should take. Unfortunately, many observers who note that tonnage on the St. Marys Canals for 1940 was 90,000,000 net tons, whereas that carried by the St. Lawrence Canals was only 6,500,000 tons, attempt to draw the obvious inference but are usually misled.

The only sound economic basis upon which to judge the navigational and transportation phase of the present undertaking must be (a) either the existing transportation facilities are inadequate or (b) the gain in traffic or the reduction in rates or both to be obtained by completion of the project would more than offset the necessary expenditure together with the losses so sustained by the present transportation facilities.

Commerce Is Mainly Bulk Freight

In seeking a satisfactory answer to these questions, it is well to

[58]Cf. MacElwee, R. S. and Ritter A. H.: *Economic Aspects of the Great Lakes-St. Lawrence Ship Channel* (The Ronald Press Co., New York, 1921) and Ritter, A. H.: *Transportation Economics of the Great Lakes-St. Lawrence Ship Channel* (The Great Lakes-St. Lawrence Tidewater Association, 1925). Also, Report of Interdepartmental Board, Senate Document No. 116, 73rd Congress, Second Session, and the *St. Lawrence Survey*, U. S. Department of Commerce (U. S. Government Printing Office, Washington, 1940).

iron, steel products, automobiles and general merchandise, the last carried largely in package freighters.

Records compiled by the Corps of Engineers, United States Army, show an average tonnage on the Great Lakes for the period 1927 to 1936, exclusive of Canadian coast-wise shipments, of 115,000,000 tons, of which the above four commodities made up almost 83%.[59] This volume of traffic is greater than that carried by all Canadian railways and considerably in excess of the combined tonnage of the Panama and Suez Canals (in 1940 it was almost three times as great).[60] And it must be remembered that this is carried in a navigational season of but seven and a half to eight months.

The bulk freight commerce recorded for 1940 was by a narrow margin the heaviest on record — 142,874,985 net tons,[61] made up as follows:

Iron ore	71,358,540 tons
Coal	46,978,179 "
Grain	9,644,950 "
Limestone	14,893,316 "

Other bulk freight—petroleum, sand, etc., and mixed cargoes—brought the total to well over 150,000,000 tons. The traffic in miscellaneous goods for local transfer may be eliminated from this discussion as well as the ferrying of railroad freight across Lakes Michigan and Erie. What is of major concern here is the bulk freight, of which the above four items comprise the greater part.

Seaway Will Not Increase Bulk Traffic

The dominant commodity, iron ore, moves easterly or southerly from harbors in Minnesota and Michigan to the steel mills of Chicago and the great steel producing areas of Lake Erie, with a small amount now passing through the Welland Canal consigned to the Steel Company of Canada at Hamilton, Ontario. This traffic is almost wholly American in destination, principally to the Lake Erie mills which are located conveniently to the coal producing regions of Ohio, Pennsylvania and West Virginia. It is difficult to visualize any effective demand abroad for this ore, or that one might exist in Canada east of Lake Ontario for that matter, with the presence of large supplies in Nova Scotia and Newfoundland.

Coal, the second most important item, moves westward, generally

[59]The Great Lakes (The Lake Carriers' Association, Cleveland, Ohio, 1938).
[60]CANADA YEAR BOOK (King's Printer, Ottawa, 1940).
[61]Annual Report of the Lake Carriers' Association, 1940 (The Lake Carriers' Association, Cleveland, Ohio, 1940).

from Lake Erie ports to harbors on Lake Michigan and Lake Superior, Canadian as well as American. Shipments to Ontario are by boat across Lake Erie, or through the Welland Canal and then across Lake Ontario. As coal constitutes normally about one-half the tonnage of iron ore and grain, a portion of the west-bound carriers must operate in ballast. The St. Lawrence improvements would permit American proceed from analysis of the present traffic on the Great Lakes - St. Lawrence System. The commerce of the Great Lakes mainly comprises four commodities of bulk character—iron ore, coal, grain and limestone. There are also substantial shipments of lumber, pulpwood, sand, scrap coal to reach the Province of Quebec in larger bottoms than is now the case but any increase of this type would immediately counter the avowed policy of the Dominion Government, which has been to encourage the sale of Nova Scotia coal in the central provinces by generous subventions. Because of its qualities, no overseas market is known to exist for any considerable volume of coal from American mines and, accordingly, the Great Lakes - St. Lawrence project would effect very minor changes in this traffic.

Limestone, now the third most important item in volume, is utilized chiefly as a flux in the smelting or iron ore but in considerable quantities as well for construction purposes. Originating chiefly in the central regions of the Great Lakes in the United States, this traffic moves generally easterly or southerly to the furnaces in the Chicago area, Cleveland, Lorain, Toledo and Buffalo. Ships engaged in this trade generally have no return cargoes in the shorter distances which they traverse. Deepening the waterway will have no appreciable effect on this traffic.

Present Course of Grain Movement

The fourth item at the moment, and to Canada the paramount one, is grain, chiefly wheat, moving east from the head of the Lakes and ports on Lake Michigan. In 1940 Lake shipments of wheat—231,000,000 bushels — were, with the exception of 1939, the largest of any season since 1931 and much higher than 1917 to 1918 or 1919 to 1920.[62] Total grain shipments in 1940 were 336,000,000 bushels.

Of the wheat carried on the Lakes in 1940, 176,000,000 bushels originated in Canada and 55,000,000 in the United States. Of this traffic 156,000,000 bushels was consigned to Canadian ports and 85.1

[62]All statistics from this point forward with reference to traffic on the Great Lakes are taken from the Annual Report of the Lake Carriers' Association for the year 1940, unless otherwise mentioned.

millions to American ports. The detailed distribution of the 1940 movement of wheat on the Lakes was as follows:

CANADIAN WHEAT		AMERICAN WHEAT	
(The quantities shown are million bushels)			
Georgian Bay	56.9	Buffalo	47.0
Goderich	13.2	Cleveland	.9
Sarnia	5.5	Toledo	.8
Port Colborne	19.4	South Chicago	2.4
Toronto	3.2	Oswego and Ogdensburg	.4
St. Lawrence River	32.5	Georgian Bay	.8
Buffalo	34.0	Goderich	.2
Erie	1.7	Sarnia	.1
South Chicago	.1	Port Colborne	.6
Oswego and Ogdensburg	7.7	St. Lawrence River	1.7
Other	1.8	Other	.1

Most exports of Canadian and American grain from the Great Lakes move "all-water" to Montreal or other St. Lawrence ports or to Buffalo. Some moves direct to St. Lawrence harbors in the smaller canallers, some has been forwarded overseas direct by means of small freighters, but most is transshipped at Port Colborne, Buffalo or Kingston from the larger boats of the Upper Lakes fleet to smaller ships for passage through the St. Lawrence canals.

Considerable grain is unloaded at ports on the east side of Lake Huron and Georgian Bay—Goderich, Owen Sound, Port McNicoll and Sarnia—and transshipped by rail after the close of navigation to Halifax or St. John. Rates on this rail traffic are extremely low considering the distance—the same as in operation by the Interstate Commerce Commission for grain moving from Buffalo to New York. Much of the grain unloaded at these ports, however, is for domestic milling and consumption in Ontario or Western Quebec, chiefly the former.

The grain unloaded at Buffalo may be milled in the United States for consumption or exported from the eastern Atlantic ports of New York, Albany, Philadelphia and Baltimore. Most export grain from Buffalo to Atlantic coast ports is shipped by way of the New York State Barge Canal but a small amount is transferred annually to canallers for consignment through Montreal and other St. Lawrence ports.

For the crop year, 1938-1939—the last before the present conflict—lake shipments of Canadian wheat from Fort William-Port Arthur were 177.1 million bushels, 146.6 going to Canadian ports and 30.2 to American harbors. 44.4 millions were unloaded at Lake Huron and Georgian Bay ports, 34.8 at Port Colborne and 19.1 at Buffalo. The

balance was unloaded at points on Lake Ontario and the St. Lawrence River. Direct export clearances from Port Arthur-Fort William were 337,000 bushels.[63]

From the St. Lawrence ports during the same crop year, including the grain harvested in Ontario and Quebec, 73.0 million bushels were exported and from Halifax and St. John 3.2 millions. Of the wheat exported to the United States 12.2 millions were cleared for export via New York, Albany, Boston, Philadelphia and Baltimore and 635,517 bushels were consumed in the United States or were milled in bond.

Possible Grain Diversion to St. Lawrence Is Small

For seasonal reasons, all-rail shipments of grain from Lake Huron and Georgian Bay ports to the seaboard would not be affected by the proposed improvements to the St. Lawrence. The diversion of the Canadian grain shown above as flowing through Buffalo for export would not constitute a substantial addition to traffic on the St. Lawrence and would undoubtedly lead to a rate war with the New York State Barge Canal. By virtue of the type of vessels which ply this canal such a rate war might become exceedingly dangerous to all shipments by way of the St. Lawrence. Even if all movements of wheat, United States and Canadian, to tidewater via Buffalo and the New York State Barge Canal in 1940 had been diverted to the St. Lawrence route, the total would have been only 16,000,000 bushels. In 1939 the total would have been but 11,000,000.

The deepening of the St. Lawrence waterway below Prescott accordingly would not increase appreciably the movement by this route of the major items of traffic which now utilize the Great Lakes - St. Lawrence system above that point. As to savings on the commodities now moving east of Prescott, it is necessary to dismiss fantastic figures frequently put forth—such as eight to ten cents a bushel for grain. In 1940 the rate on grain from Fort William to Montreal was only seven cents and the same quotation has prevailed this year. Some reduction in the rate should be possible from the use of larger ships and the elimination of the transfer from upper lake to lower lake carrier, but competent authorities contend that the reduction would not be more than 1½ cents per bushel. It must be borne in mind that, historically, whenever a buyer's market prevails, reductions in the cost of transportation are more likely to accrue to the benefit of the buyer than of the vendor.

[63]The statistics in this paragraph and the succeeding one are taken from the Canada Year Book, 1940, page 593.

Canada's Grain Export May Decline

Canadians are most vitally interested in the wheat situation. With a carry-over of approximately 460,000,000 bushels on July 31, 1941, and all European markets cut off with the exception of the United Kingdom (this too may be affected seriously by the application of the Lease-Lend measure), wheat is Canada's second greatest financial and economic problem, subordinated only to National Defence. What is to be the future of Canadian wheat? Is it to be produced for export in as large quantities as heretofore? Will there be the export market at the conclusion of hostilities which once existed, and consequently the movement from lakehead to seaboard? These are questions which advocates of the seaway must, but find difficult to answer satisfactorily.

St. Lawrence Traffic Has Declined

Despite the above considerations with respect to existing traffic, the fact that tonnage through the St. Lawrence canals in 1940 was only 6,484,320 net tons, whereas the Welland Canal carried 12,909,597 and the St. Marys Falls Canals at Sault Ste. Marie 89,858,319, appears to suggest that a serious bottleneck must exist in the Great Lakes - St. Lawrence System. It is significant, however, that tonnage on the St. Lawrence canals has declined markedly since 1938 despite improving business and war activity. In 1937 traffic aggregated 9,195,439 net tons; in 1938, 9,236,318; in 1939, 8,340,165, and in 1940 but 6,484,320. In 1939 and 1940 several canallers were transferred to the British Merchant Marine, it is true, but apparently little effort was made to replace these. Conferences with several steamship executives have convinced the writer that the present canal fleet is quite adequate and that through the policy of rationalization of cargoes and despatch being used, it can meet much greater demands if they should arise.

Rail Congestion Is Improbable

If the transportation bottleneck does not exist in the St. Lawrence at the present time, then it certainly must be present in the railway facilities of Canada and the United States. In the course of this analysis the writer had occasion to consult several prominent Canadian railway men and was assured unhesitatingly that no traffic congestion was now taking place or had occurred since the outbreak of war in September, 1939. Because of better organization of shipping and supply by the Governments of the United Kingdom and Canada the congestion so characteristic of World War I has not occurred and in the opinion of these gentlemen would not occur. With limited additions of rolling stock and having regard to the restricted grain movements anticipated

for some time to come, it was their opinion that increases in freight traffic of as much as 50% over that handled at the moment could be moved without difficulty. In the United States railroad congestion, too, has yet to appear. On August 10th the following news item appeared in the New York Times:

> "Despite increases in traffic on all common carriers since the start of the defence program a year ago, no reports of delays in production due to lack of transport have reached the transportation division of the Office for Emergency Management, says Ralph Budd of the Advisory Commission to the Council of National Defence. His statement follows:
>
> " 'The inland transport — railroads, trucks, pipelines, Great Lakes and inland waterway carriers — have met successfully all demands resulting from the constantly expanding defence program and those connected with civilian needs'."[64]

Potential Seaway Traffic Is Questionable

Turning next to the increases in traffic from new commodities which may be expected to use the waterway upon its completion various estimates have been made. The maximum transportation capacity of the projected seaway has been estimated at 25,000,000 tons[65] — some 16,000,000 tons more than that carried by the existing St. Lawrence canals in the years 1937 and 1938. The St. Lawrence Survey of the United States Department of Commerce[66] contends that the new traffic moving eastward would be mainly automobiles and iron and steel products, and moving westward principally sugar. Other proponents have added petroleum, coffee, rubber, bananas, clay, agricultural implements, packing house products and flour.

For Canada's part, an analysis of the volume of these commodities landed from or loaded to vessels at Montreal, Three Rivers, Quebec and Halifax and St. John during 1939 leads one to question very seriously the amount of traffic of this type which might be obtained. For instance, less than 500,000 tons of sugar were landed at east coast ports in that year and of this 61,000 tons moved out again by water. With the operation of the new 236-mile pipeline from Portland, Maine, to Montreal[67] and the restrictive measures on gasoline consumption in operation in Canada, traffic of this commodity is bound to decline seriously. It is

[64] THE NEW YORK TIMES, August 10, 1941.

[65] Senate Document No. 116, 73rd Congress, Second Session, page 76 (U. S. Government Printing Office, Washington).

[66] *The St. Lawrence Survey*, U. S. Department of Commerce (U. S. Government Printing Office, Washington, 1940).

[67] Cf. THE NEW YORK TIMES, July 27, 1941.

important to bear in mind, too, that artificial transportation facilities such as this pipeline show a tendency to persist after the emergency which led to their creation. Traffic in the other commodities mentioned above was also of insignificant proportions.

Outlook for Foreign Trade Is Uncertain

It must be conceded that the potentialities in the water traffic of these commodities to and from United States ports based on pre-war figures would be much greater. It is reasonable to question, however, how much reliance may be placed upon trade statistics prior to the outbreak of war. What foreign trade may survive the conflict? Will the European countries be able to finance imports of North American goods? Will they want them in substantial quantities when they have secured alternative sources or become accustomed to doing without them? In other words, even though the hinterland in the United States to be served by the seaway is many times greater in population, consuming, and producing power than that of Canada there is still reasonable doubt as to the traffic to be gained and the reduction in rates which might be effected. For Canada, the experience of the Fort Churchill and Hudson Bay Railway gamble should still be fresh in our minds.

It is foolish to argue as do some Canadian critics that the seaway will not be used and in the same breath that by its utilization the St. Lawrence ports and much of the present Great Lakes fleet will be ruined. Either the seaway will be utilized and the ports of Montreal, Prescott, etc., suffer as well as some of the lake carriers or it will not, in which event one of the most potent arguments for the improvements is eradicated.

Ocean Liners Will Not Use Seaway

Ocean liners certainly will not come up to Detroit or to Chicago. Although 71% of the freighters in the world, representing 59% of the tonnage as of December 31, 1939, could utilize the proposed improvements (these figures are based on ships with a maximum or registered draft of 25 feet)[68] the complication is that new ships are being built larger. Of 384 vessels being constructed under the present program of the Maritime Commission only 30 could be accommodated.[69] It must be borne in mind, too, that if the proposed undertaking were in operation now, most of the lake fleet would likely be on the ocean. During the present battle of the Atlantic, which is likely to persist for a con-

[68]Cf. TIME, July 7, 1941.
[69]*Ibid.*

siderable period, it is academic to argue whether ocean vessels could or could not utilize the undertaking. The question would be rather—would it be worth while for them to use it when they are required so urgently upon the Atlantic?

Canada's vested interest in railways places her in an entirely different position with respect to any traffic losses which might occur from the United States. With over two billion dollars invested in the Canadian National Railways (not to mention accrued interest, etc.) and in view of the burdensome deficits during the depression of approximately $60,000,000 annually, the effect of the seaway on the railways must be carefully considered in this country. If traffic should be diverted to the seaway—for which no conclusive evidence has been submitted from Canada's point of view — such gains in traffic other than those which would normally arise through increases in population and commercial development must come from the railways. If the seaway does not succeed, Canada must suffer another heavy financial burden. The problem is aggravated by the fact that tolls are not contemplated for the project, despite the urgings of the Hon. Jesse Jones in this respect.[70]

* * *

Economic Aspects (Canada)—Defence

Since 1939 the strongest appeal for the completion of the Great Lakes-St. Lawrence seaway has been in its importance to continental defence. The argument as popularly propounded has embraced all the others—shipbuilding, power and navigation. It has been suggested that ocean ships and large naval vessels could be built on the Great Lakes, the power utilized for defence production and the navigation facilities assist materially in the transportation of supplies to Great Britain, etc., as well as preventing any possible bottleneck in existing transportation channels.

Advocacy of the defence aspect is not new. In fact, chronologically, it antedates all other arguments for developing the waterway. In the French regime and in the early days of the British regime the canals which were dug—small though they might be—were planned largely for military reasons.

Consideration has already been given to the other aspects of the undertaking. Considerable attention has been paid to the validity of

[70]Hearings before the Committee on Rivers and Harbors, House of Representatives, 77th Congress, First Session, pages 281 and 282 (U. S. Government Office, Washington, 1941).

the arguments from the point of view of near-term needs—the fundamental problem in the present emergency. It now remains to reconsider certain of these and to emphasize them anew.

Basically, the present undertaking cannot be considered a war measure. No one is capable of predicting with certainty the future of the present conflict or when it may terminate, but with the speed of "blitzkrieg" tactics it seems unquestioned that some sort of decision will be forced by 1945, even if hostilities continue beyond that date. Accordingly, can this project, likely to come into operation at least four years from now and possibly much later, be termed a measure of immediate war necessity?

Contemplated Facilities Are Vulnerable

The vulnerability of the contemplated facilities is also a serious factor. Bombing of portions of this continent is by no means a wild dream. What a target the powerhouse and canals in the International Rapids Section would constitute, and how expensive to effectively provide sufficient protective facilities against such a contingency! It is common knowledge that the Suez Canal has been put out of commission several times within recent months. As it is but a ditch and contains no locks, repairs can be effected rapidly. With the St. Lawrence undertaking, however, the blasting of the powerhouse or one of the lock gates might tie up facilities for a period of many months.

In Canada's present perilous condition, the factor of paramount significance is the diversion of men and materials from war production which the undertaking would require. It has been estimated that more than ten thousand men would be required, including a considerable number of skilled tradesmen, 84,000,000 board feet of lumber, 130,000 tons of steel and 6,650,000 barrels of cement.[71] These figures do not include the additional quantities of such materials required for the construction cofferdams, generating equipment, etc. In Canada's case, labor to be utilized on the seaway and materials for its construction would have to be diverted from the production of planes, guns and ships. An even more serious problem would be the procurement of the dredges, giant cranes, electrical equipment, etc.—now extremely scarce in both Canada and the United States.

Project Competes With War Effort

Canada has now reached a stage of virtually complete employment of both men and materials. The Monthly Commercial Letter of the

[71]Cf. TIME, page 58, July 7, 1941, and testimony of Brig.-Gen. Robins, Note 21.

Canadian Bank of Commerce for July, 1941, shows the per cent of current capacity utilized by a number of industries which would be affected by the proposed undertaking.

	% Current Capacity Utilized[72] June, 1941
Iron and Steel Trades	139
Heavy	149
Medium	129
Light	130
Non-ferrous Metal Products	150
All Industry	113

Accordingly, the employment of men and materials in the new undertaking must be at the expense of existing production, either that for war purposes or through further restrictions on that for civilian needs, already curtailed.

From Canada's point of view the Great Lakes-St. Lawrence project as contemplated in the Agreement of March 19, 1941, cannot be regarded as a war measure. If it could be justified as a peace-time undertaking, and to date the evidence with reference to Canada alone is overwhelmingly opposed, why not defer it until after the termination of hostilities? As a reconstruction measure, it might have some validity but even there the arguments are not conclusive.

[72]The Monthly Commercial Letter of the Canadian Bank of Commerce, July, 1941.

GOVERNMENT FINANCE—CANADA

Some Comparisons Between 1914-1918 and 1939

E. A. HORTON

CANADA has been afflicted with two major wars within 22 years. It is interesting to observe the effect of our municipal, Provincial, and Federal spending and debt by means of an analysis of the results from 1914 to 1919; by a survey of the after effects which are clearly portrayed in the period 1920 to 1939; and then to measure the effects so far in the current struggle.

Municipal and school rates were increased materially in most sections of Canada in the period 1914 to 1918. In the City of Victoria, British Columbia, the mill rate rose from 22.35 to 27.77. In Edmonton, Alberta, the mill rate rose from 17.5 to 30; in Winnipeg, Manitoba, the increase was from 14.8 mills to 20 mills; in Toronto, Ontario, the increase was from 19.25 mills to 30.5 mills; in Montreal, Quebec, the increase was from 14 mills to 19.93; and in Halifax, Nova Scotia, the mill rate went from 20 mills to 25.4 mills.

In 1914 Canada had completed an era of vast expansion due to the opening up of the west and the carrying charges on debts incurred for large governmental undertakings were just beginning to affect taxes. The bursting of the western boom also brought increased interest rates, particularly in western areas. In addition, the increasing general use of motor vehicles was creating a need for hard surface roads then almost non-existent in other than urban municipalities. Following 1915 higher wage and material costs added considerably increased operating expenses to the municipalities. Also many municipalities entered into auxiliary war undertakings such as the financing of hospital units, the insurance of soldiers and the continuance of salaries and wages of municipal employees that enlisted. As a result, taking 16 major cities in Canada, the average increase in combined municipal and school taxes was over 5 mills on the dollar of assessed value for the period 1914 to 1918.

From 1920 to 1930, inclusive, Canadian municipalities went on a spending spree adding greatly increased debt service charges for all kinds of new local improvements, educational facilities, fire and police protection, etc. For instance, the cities of Ontario in 1925 reported a tax levy of $45.42 per person and by 1931 this had risen to $52.25 per person.

Then came the recession followed by the major economic collapse

and the heavy toll of unemployment relief costs entered the picture, for in 1931 it became legal by provincial-municipal laws to issue and tax for unemployment relief expenditures.

Consequently, with shrinking revenues from current taxation and with the added and new costs of unemployment relief a great number of municipal defaults ensued following 1931. In Ontario alone, some 35 municipalities representing a debenture principal and interest default of $108,000,000 were forced to defer annual debt services. Fortunately, the provincial governments wisely inaugurated a system of supervision over the full scope of operations for those municipalities in default by pruning expenses, eliminating capital expenditures and operating on a pay-as-you-go basis. With minor exceptions, the defaults were controlled to the point where reserves for the payment of interest and principal were sufficient to commence repayment to the investors. Tax levies were pegged or increased to meet local situations.

Sufficient common sense was applied to municipal operations generally that by 1939 by far the greater majority of municipalities were experiencing considerably reduced tax rates and decreasing annual debt charges. In 1934 the per capita expenditures for 16 major cities in Canada amounted to $55.78 per person and by 1939 this had decreased to approximately $46 per person.

Hence at the outbreak of the current conflict, in September 1939, Canadian municipalities, with the exception of a certain few that were still short of meeting maturing debt and operating expenses, entered this trying period with very much improved fiscal positions. Current tax collections had been increasing since 1937 for the majority and the creation of new debts had been decreasing. It was generally conceded that, wherever possible, municipalities must operate on a pay-as-you-go basis and avoid ordinary or capital expenditures which might in any way interfere with the colossal burdens to be imposed upon the Federal Government by the war effort.

Fortunately, the great octopus of unemployment relief which extracted anywhere from 33% to 50% of its annual cost from the municipalities had shrunk. In 1933, 1,250,000 Canadians were on relief; in September 1939 there were 420,000; in October 1940 there were but 250,000, and by August 1941 the figure had shrunk to approximately 180,000.

It was realized, however, that certain things would make it difficult for the municipalities to decrease expenses. There were increasing costs

of wages, materials and supplies entering the picture. The protection of public utilities such as power plants and waterworks from the danger of sabotage added a considerable burden until the majority of this cost was assumed by the Provincial and Federal Governments. Certain Canadian municipalities which had sold bonds in the past payable in American exchange commenced to pay a heavy penalty. A few far-sighted communities had purchased American exchange prior to the outbreak of the war at a much lower exchange rate, to meet their requirements for a limited period.

In 1919, Provincial expenditures on current account, exclusive of charges on debt, were about 16 millions of dollars greater than in 1913. They had been faced with higher interest rates, increased road expenditures and large auxiliary war expenses. To meet the new costs nearly all provincial governments imposed amusement taxes. Ontario levied a provincial war tax of one mill on all ratable property; Saskatchewan levied a patriotic revenue tax of one mill; Manitoba passed a patriotic levy in 1916; Nova Scotia applied a war tax act in 1915; and several substantially increased taxes on income and different classes of property. Mine operations and mine proceeds were also taxed more heavily. These new taxes managed to see the provinces through the war period. In the main, the majority of these taxes were repealed following the cessation of hostilities, but in some instances amusement taxes and nuisance taxes continued.

By 1922 Provincial expenditures on a per capita basis were $10.12. By 1938 they had risen to $21.71, the majority of the increase being brought about by increased expenditures on public works and highway, educational facilities, debt service, social welfare and unemployment relief. Further increases were experienced in 1939 and to all appearances the increases have not been stopped—by reason of mounting costs for social welfare and debt service.

In the last war period federal spending, with respect to the ordinary expenditures of the Dominion Government exclusive of charges on debt, pensions, soldiers' settlements, war, etc., increased about 23 millions. Since the financing of the war had been the responsibility of the Dominion Government, interest on debt alone increased 94 millions in this period from 1914 to the end of 1919. By 1928 expenditures of the Dominion Government amounted to $36 per person. By 1938 the expenditures were $47.72 per person, and for the year ending March 31, 1939, $49.03.

So much then for municipal, provincial and federal spending prior to the outbreak of this war and during the last war period.

We may now turn to an examination of municipal debt during the last war period. The debts of the municipal governments, including debts contracted for schools and other educational purposes, were $764,592,000 at December 31, 1919, compared with approximately $537,202,000 at December 31, 1913. Many issues were contracted for public utilities such as hydro-electric plants, waterworks, gas works, etc., that served a war need.

By 1927 gross funded municipal debt was $1,147,000,000, or $106 per capita. By 1930 it was $115 per capital and by 1937 it was $104. You will recall that I mentioned briefly the addition of new municipal debt for various purposes in the lush years 1926 to 1930. Closer provincial supervision of municipal financing, a high cost to the municipalities of new issues and a general diminution of requirements brought about the municipal debt reduction from 1930 to 1939.

In the present war the practice of issuing municipal debentures for auxiliary war services and for patriotic grants has been practically abolished. In the main, the present control of municipal debt issues is such that debt can be issued only where it is absolutely necessary for reasons of public health or public safety. All other needs must be taxed and paid for out of current revenues. Unless some unforeseen circumstances enter the picture the majority of counties in Ontario will be entirely free of debt before 1946, and by 1949 the outstanding debt of cities, towns and villages generally throughout the Dominion will have decreased something like 30%.

Turning to the picture of Provincial Government debt, this figure in 1913 was 193 million and by 1919 it amounted to 410 millions. The largest increase was in the Province of Ontario, where the expansion was from 34 millions to 115 millions, but it must be remembered that in this province there is a concentration of commerce and industry for the Dominion. The main purpose for which provincial debts were incurred are as follows:

Railway guarantees and aids
Hydro utilities
Public utilities such as telephones, elevators, housing, etc.
Public administration buildings
Highways.

Following the war provincial debt increases were devoted largely

to the development of resources and by 1927 the gross funded debt was $783,000,000, or $106.88 per capita. By 1937, with the impact of funding unemployment relief costs following 1930, provincial debt was double the amount of 1927 at $170 per capita. Continued increases occurred during 1938 and the first part of 1939 so that the total debenture debt of the provinces is now roughly $1,700,000,000.

Since the advent of war in the fall of 1939, very little new highway or public works debt has been added by the provinces. Additional debt service charges, however, have been incurred by reason of bonds payable in American funds.

With regard to the Dominion Government debt, as the financing of the last war was the responsibility of that Government, a staggering increase in its debt was to be expected. The debt rose from 406 millions at March 31, 1914, to $2,750,000,000 at March 31, 1920. War expenditures amounted to roughly $1,670,000,000 in this period and other expenditures which contributed to increased debt were railway aid subsidies, advances and guarantees, canal undertakings, advances to Imperial and foreign governments, advances to provinces and banks, expense of the Soldiers' Settlement Board and the undertaking of public works and buildings.

By 1927 the Dominion Government debt was 2½ billions but by 1937, through the development of resources and the recognition of social development costs in addition to unemployment relief contributions, the federal debt amounted to $3,300,000, or about $275 per capita.

In terms of the combined governments, provincial and municipal debt at the outbreak of the last war was approximately $54 per capita. At the commencement of this war the figure was approximately $700 per person.

Total governmental expenditure in Canada on peace-time activities before the outbreak of the present war was approximately 3 millions per day. This is on current account alone and does not include expenditures on highways, buildings, etc. At present the Dominion Government alone is spending in excess of 4 millions per day to meet the costs of war or roughly 1½ billions per year, and the magnitude is increasing. Add to this ordinary non-war expenditures of the Federal Government amounting to 475 millions, and annual expenditures of provincial and municipal governments amounting to approximately 575 millions, and the combined war and non-war spending volume in the Dominion for all purposes in connection with government is at present rate of well over 2½ billions per year.

How does this spending correlate with national income? In 1929 the national income amounted to $5,350,000,000 per year. This dropped to $3,500,000,000 by 1937. In 1940, through greatly increased industrial and commercial activity, the national income was estimated at 4,700 millions approximately and it is anticipated that in 1941 the national income will be fairly close to 6 billions of dollars. At the beginning of 1941, 44 cents of every dollar earned in Canada was going to the production of war goods. It is interesting to note how some of that money is being spent. With 170,000 soldiers on active service, the equipment cost per soldier is roughly $115. Maintenance per soldier while remaining in Canada is roughly $5.50 per day. Overseas maintenance costs per man per day are $7.11. Armoured divisions are in the process of being equipped at the rate of 250 million per division.

In the last war a fighting plane cost $8,000. In this war it costs $25,000 to build a Spitfire, $50,000 to build a Hurricane fighter and $150,000 or a Bolingbroke bomber. Gun carriers cost $5,000 each. Ordinary army trucks cost $1,500. A full tank brigade costs $60,000,000. Anti-aircraft guns cost $15,000 and in one hour's firing spend more than $40,000 of the taxpayers' money. One mine sweeper costs $175,000; one Corvette slightly less. At the beginning of this year the Minister of Finance for the Dominion of Canada said he wanted $666,000,000 for the army, $170,000,000 for the navy, $386,000,000 for the air force and $180,000,000 for munitions, all of which amounts to approximately $1,500,000,000 per year.

In addition, Canadians will have to find something like one billion as a contribution of assistance for British credit balance in Canada in order to conserve sterling exchange. In all, it is estimated that 60 cents out of every dollar earned by the individual will go to the purposes of the State by 1942. Comparing this with the last war, from 1914 to the spring of 1918, the cost to Canadians was less than $900,000,000. It is quite possible by the early part of 1942 that the spending rate for one year in this present struggle will be double the cost of that period from August 1914 to April 1918. The Dominion Government budget of June 20, 1940, set out two objectives: First, that the country be brought as rapidly as possible to the full use of its resources and man power and, secondly, that the country follow a pay-as-you-go policy as far as possible. The Minister of Finance stated that he had endeavored to raise the rates of direct taxation to the highest level that he thought the Canadian people could be asked to bear for the year. On the other hand, it is a certain fact that the British 50% income tax weighs far

more heavily on an Englishman than the Canadian with an equivalent income under the Canadian tax reported last spring.

From the foregoing these facts appear important: first, municipal taxation is decreasing and has not followed so far the sustained increases of the last war; second, provincial expenditures are not expanding compared to the increase experienced previous to 1939 and there is every reason to believe that substantial reductions in provincial expenditures will come about; third, the increase in the national income is so far more than sufficient to offset any worry with respect to the total Canadian ability to pay; fourth, income and corporation taxes and defense levies have so far been paid cheerfully and completely by the Canadian people and there are vast pools of untapped credit yet available; fifth, in the recent war loan, which was the third of this war period, although 600 millions was authorized, the total subscriptions amounted to $823,000,000, with every indication that an extended offering period would have added considerably to this figure.

There is, however, one nigger in the wood pile that has caused national concern since the outbreak of war.

In August 1937 a Royal Commission on Dominion-Provincial, including municipal, Relations was established. During January 1941 the provinces and the Dominion Government got together at the capital with the apparent intention of discussing and implementing if possible the findings and recommendations of this Commission — popularly termed the Rowell-Sirois Report.

The conference met but disbanded, abortively, on the plea of certain provinces that war was no time in which to discuss such sweeping proposals. The federal authorities stated that they did not wish to force the changes proposed by the report in view of such opposition, although the Minister of Finance gave clear warning that the Federal Government would be compelled to invade provincial fields of revenue and taxation in lieu of the inability of all parties to get together on common ground.

Under the Commission's recommendations, provincial income and corporation taxes and the succession duty field were to be abandoned, in return for which the Federal Government would reimburse the provinces by means of subsistence grants and, further, the Dominion Government would take over certain social service costs, etc. The Dominion Minister of Finance has made his warning good, and provincial governments now have the opportunity either to force double

taxation on provincial taxpayers by way of personal income and corporation taxes, or undertake agreements with the Federal Government that will assure the provinces of no loss of a standard of revenue that was enjoyed previous to 1941.

Canadians are conscious of the fact that the cessation of hostilities will be followed by severe dislocations in industry and finance. Business taxation meanwhile must not impoverish the country's productive assets so as to render them unable to give all their potential support to the war and to compete in the markets of the world during the post-war years. Taxation on business must, accordingly, recognize the necessity for corporations to place aside certain funds for losses, replacements, etc., to meet a post-war period of anticipated increased immigration into Canada and as well against the uncertainties of the period of reconstruction.

With respect to governmental planning, it is recognized that federal post-war reconstruction should embrace national highways, reforestation, land reclamation and conservation, and the construction of public buildings; that provincial planning should recognize these things and in addition flood control and power developments; and that municipal planning must provide post-war construction of traffic arteries, sewers and sewage disposal plants, and all kinds of other local improvements and public buildings.

In this regard, the provincial and municipal governments of Canada are husbanding their resources, postponing improvements, reducing their debts and accumulating accordingly large pools of necessary capital improvements and large reserves of credit. At the cessation of hostilities they should be in a strategic position from which to exercise leadership to meet the post-war problems.

AN ANALYSIS OF THE CONTENTS OF SIXTEEN CANADIAN FARM PUBLICATIONS FOR THE YEAR 1940

M. Y. SHEPPARD

In May, 1939, Mr. J. Mitchell concluded a study for 1938 of the editorial content of six Canadian farm publications in partial fulfilment of the requirements for the degree of Bachelor of Arts of the University of Western Ontario. This study seeks not only to bring up to date Mr. Mitchell's analysis but as well to secure more complete coverage of agricultural periodicals in the Dominion.

* * *

THE figures presented in the exhibits are the result of an actual measurement count of all space in each issue for the year 1940. Every effort has been made to ensure the accuracy of these figures but they cannot be guaranteed.

The method of classification used in this analysis was adopted because it adequately and clearly presents the desired information in a relatively simple manner.

The contents of this type of magazine can be easily divided into four main divisions, namely: Agriculture, Home, General and Advertising. These main classifications were subdivided insofar as possible to bring together material which is indicative of a particular type of reader.

An explanation of the individual classifications follows:

AGRICULTURE

Animal Husbandry includes all space devoted to the breeding, feeding, care, and health of all farm live stock. Also contained under this head is all space devoted to the pictures of live stock, reports of breeders association meetings, and the reports of all live stock competitions or shows. Reports, discussions, and pictures of dairy cattle are not included here, however, but have been placed under the dairy head. Also all space devoted to questions and answers concerning farm live stock has been included under the farmer's service heading.

Field Husbandry includes all space devoted to soil irrigation and preparation, and the sowing, cultivation, and harvesting of all field

COMPARISON OF AVERAGE CONTENTS BY CLASSIFICATIONS EXPRESSED IN NUMBER OF PAGES

	Le Bulletin des Agriculteurs	Canadian Countryman	Country Guide	Family Herald & Weekly Star (Eastern Edition)	Family Herald & Weekly Star (Western Edition)	Farm & Ranch Review	Farmer's Advocate & Home Magazine	Farmer's Magazine	Free Press Prairie Farmer	Maritime Farmer	The P.E.I. Agriculturist	La Presse*	Saskatchewan Farmer	La Terre de Chez Nous	Western Farm Leader	Western Producer
Animal Husbandry	1.5	1.1	1.7	1.6	1.4	1.1	1.4	2.9	0.2	1.4	0.8	0.6	1.1	0.7	0.2	0.8
Field Husbandry	0.8	0.3	3.1	1.5	0.4	0.9	0.6	1.2	0.2	0.4	0.1	0.2	0.8	0.2	1.1	0.5
Dairy	0.9	0.5	0.1	0.7	0.3	0.4	0.5	1.5	0.1	1.	—	0.4	—	0.4	1.1	0.1
Horticulture — Fruit	0.3	0.6	0.6	0.5	0.4	0.1	0.2	0.4	—	0.4	—	0.4	0.1	0.2	—	—
Horticulture — Vege.	—	0.1	0.4	0.1	0.1	0.1	0.1	0.3	—	0.5	—	0.1	—	—	—	—
Horticul. — Gardening	0.1	0.2	0.3	0.3	0.6	0.1	0.1	0.5	—	0.2	—	0.4	—	—	—	0.3
Poultry	0.4	0.5	0.8	0.7	0.6	0.1	0.5	1.6	0.1	1.	0.8	0.2	—	0.1	—	0.1
Market Data	0.6	1.5	—	1.	0.7	—	0.3	0.8	0.9	—	0.4	1.2	0.2	1.2	0.1	0.8
Correspondence	0.2	0.9	—	1.1	0.1	0.4	0.4	1.4	0.1	0.3	0.1	—	0.6	0.9	0.1	1.
Farmers' Service	0.2	—	—	1.5	0.6	—	0.1	0.9	0.3	—	0.2	0.2	0.1	0.3	—	—
Farm Mechanics	0.5	—	0.8	0.6	0.7	0.3	—	0.8	0.2	—	—	0.3	—	1.1	—	0.1
General Agriculture	1.2	1.6	2.7	1.	2.3	1.	1.8	4.	2.	2.5	1.9	1.8	0.3	1.3	0.7	1.4
Total (Prac. Farming)	6.7	7.3	10.5	10.6	8.2	4.5	6.0	16.3	4.1	7.7	4.3	5.8	3.2	6.4	3.3	5.1
Health and Beauty	0.6	—	0.3	0.2	0.3	0.1	0.3	1.0	0.4	0.2	0.1	0.3	0.3	0.1	—	0.2
Religion	—	0.4	0.2	0.8	0.7	—	0.2	0.5	0.4	0.1	—	0.4	—	0.2	—	—
Style, Fashions, etc.	1.6	0.6	0.8	1.4	1.3	0.3	0.3	1.5	0.7	0.2	0.1	1.4	1.9	0.2	0.1	0.8
Cooking	0.5	0.2	1.2	1.2	1.3	0.5	0.3	1.4	0.7	0.9	0.7	0.2	0.7	0.1	0.2	0.1
Youth and Children	0.9	0.3	1.8	2.6	2.1	0.3	—	1.	1.7	0.3	—	0.8	0.7	0.1	—	3.
Home Correspondence	1.8	0.7	0.4	0.2	0.2	0.8	0.5	1.1	1.1	—	—	0.7	0.1	—	—	0.4
Home Making	0.7	0.2	0.3	0.4	0.2	—	—	0.5	0.3	0.1	—	—	0.1	0.1	—	—
General Home	0.3	0.7	1.8	0.3	0.9	0.1	0.8	3.	0.8	0.8	0.2	0.4	1.	0.6	0.2	1.6
Total (General)	6.4	3.2	6.8	7.1	7.0	2.1	2.4	10.	6.1	2.6	1.1	4.2	4.8	1.4	0.5	6.1
Editorial	0.6	0.8	2.5	1.5	2.2	3.2	0.6	1.	1.4	0.8	1.1	0.7	1.	0.8	1.	1.
Fiction	3.7	2.6	10.	3.2	3.5	0.8	2.3	6.	3.	1.4	0.3	3.1	—	0.1	—	1.9
Features	0.8	0.7	0.6	1.6	1.8	0.4	0.1	0.4	1.	0.3	—	1.1	0.7	0.7	0.2	0.3
Humor	0.5	0.6	0.9	1.1	1.	0.6	0.1	1.	3.2	0.1	0.7	0.2	3.4	0.5	0.5	1.4
Music, etc.	0.2	0.1	—	0.7	0.7	0.1	0.2	0.4	0.5	0.1	0.3	0.1	—	0.1	0.1	0.3
Current Topics	0.7	0.9	2.9	5.2	5.2	0.1	0.5	1.3	10.8	0.8	0.8	3.	3.5	1.3	4.1	5.4
Sport and Radio	—	—	0.1	0.7	0.6	0.1	—	0.6	1.2	—	—	0.6	2.	0.1	0.4	1.7
Contests	1.	1.1	2.4	1.7	1.5	3.	0.2	1.9	0.5	1.6	0.9	1.1	0.7	0.9	0.2	0.4
Miscellaneous	0.2	0.2	0.3	2.4	1.6	0.1	0.1	0.5	1.1	0.2	0.5	3.1	—	1.	—	0.1
Total (Editorial)	7.7	7.1	19.7	18.1	18.1	8.4	4.1	13.1	22.7	5.3	4.6	13.	11.3	5.5	6.5	12.5
Advertising	12.8	9.4	25.1	13.8	15.8	12.3	9.8	26.4	12.7	10.2	3.	1.3	6.2	5.4	5.8	6.9
Grand Total	33.6	27.	62.1	49.6	49.1	27.3	22.3	65.8	45.6	25.8	13.0	24.3	25.5	18.7	16.1	30.6

*In La Presse, only the second section, which deals with Farming, has been considered.

COMPARISON OF AVERAGE CONTENTS BY CLASSIFICATIONS EXPRESSED IN PERCENTAGES

	Le Bulletin des Agriculteurs	Canadian Countryman	Country Guide	Family Herald & Weekly Star (Eastern Edition)	Family Herald & Weekly Star (Western Edition)	Farm & Ranch Review	Farmers' Advocate & Home Magazine	Farmer's Magazine	Free Press Prairie Farmer	Maritime Farmer	The P.E.I. Agriculturist	La Presse*	Saskatchewan Farmer	La Terre de Chez Nous	Western Farm Leader	Western Producer
Animal Husbandry	7.6	6.5	5.	4.4	4.2	7.	12.3	7.9	.6	9.1	8.	2.7	5.7	5.1	2.2	3.5
Field Husbandry	3.9	2.	7.2	4.2	1.2	5.9	4.8	3.	.7	2.6	.6	1.1	4.1	1.6	10.	2.2
Dairy	4.	2.8	.3	1.8	1.	2.5	4.2	3.8	.3	6.3	.4	1.7	—	3.4	10.8	.5
Horticulture — Fruit	1.2	3.5	1.8	1.4	1.3	.5	1.8	.9	.1	2.3	—	1.7	.5	1.1	—	.2
Horticulture — Vege.	—	.5	1.1	3.	.3	.4	.8	.8	.1	3.1	.1	.5	.1	.2	—	.1
Horticul. — Gardening	.6	.9	1.	.9	1.9	.3	.5	1.2	.1	1.6	.3	1.7	—	.3	.2	1.2
Poultry	1.9	3.2	2.3	2.	1.8	.8	3.3	3.8	.3	6.9	7.1	1.1	.2	1.1	.1	.2
Market Data	2.6	8.6	.1	2.8	2.1	—	3.3	2.	2.8	—	4.	5.3	1.1	7.9	1.5	3.4
Correspondence	.8	5.3	—	2.9	.2	2.2	2.9	3.9	.2	2.	.6	.2	3.2	6.8	.7	4.3
Farmers' Service	1.	.2	—	4.2	1.9	—	1.	2.1	.8	.2	1.3	.9	.3	2.4	.2	—
Farm Mechanics	2.7	.3	2.4	1.6	2.1	1.8	—	1.9	.6	.1	—	1.3	—	7.6	—	.2
General Agriculture	5.7	8.2	7.2	2.8	6.9	10.	15.2	10.7	6.1	15.2	18.3	7.2	1.7	9.2	6.7	5.8
Total (Prac. Farming)	32.	42.	28.4	29.3	24.9	31.4	50.1	42.	12.7	49.4	40.7	25.4	16.9	46.7	32.4	21.6
Health and Beauty	2.7	.1	.9	.5	.8	.8	2.3	2.4	2.3	1.1	.7	1.3	1.7	.5	—	.8
Religion	—	2.3	.5	2.1	2.3	.2	1.6	1.1	1.5	.7	—	1.6	.2	1.4	—	.1
Style, Fashions, etc.	7.7	3.4	2.4	3.9	3.8	1.7	2.1	3.7	2.2	1.2	1.4	6.4	9.8	1.6	1.4	3.3
Cooking	2.7	2.	3.6	3.8	3.9	3.2	2.6	3.5	2.3	5.8	6.5	.8	3.6	.8	1.6	.5
Youth and Children	4.1	1.8	5.4	7.3	7.4	2.	—	2.4	5.2	1.7	—	3.5	3.8	.6	—	12.6
Home Correspondence	8.1	4.3	1.1	.5	.6	4.7	.4	2.6	3.4	—	—	2.9	.6	.3	.8	1.9
Home Making	3.3	1.2	.8	1.1	.5	.1	.2	1.3	.9	.8	—	.1	.6	.6	—	.1
General Home	1.6	4.	4.5	2.9	2.7	1.	6.3	8.3	2.3	5.1	1.5	1.6	5.2	3.4	2.2	6.6
Total (General)	30.2	19.1	19.2	20.1	22.	13.7	15.5	25.3	20.1	16.4	10.1	18.2	25.5	9.2	6.	25.9
Editorial	2.8	4.7	7.1	4.3	6.7	19.5	5.	2.4	4.2	4.8	11.	3.7	5.2	6.3	9.8	4.3
Fiction	18.5	14.2	24.2	9.	9.2	5.2	19.2	15.4	8.8	9.	3.1	12.5	—	.5	.3	7.7
Features	3.7	4.1	1.8	4.5	5.5	2.3	.7	1.	4.	2.2	—	4.8	3.5	5.5	2.7	1.1
Humor	2.5	3.4	2.7	3.	3.1	3.6	1.1	2.6	9.7	.8	6.7	.7	17.2	5.	4.6	6.
Music, etc.	.9	.5	—	1.8	2.1	.8	1.8	1.	1.1	.8	3.1	.6	.2	.8	.8	1.1
Current Topics	3.5	5.4	8.3	14.5	15.8	4.5	4.3	3.	31.2	5.	10.8	13.1	17.6	10.	38.	22.5
Sport and Radio	—	—	.2	2.	1.9	.3	—	1.4	3.5	.2	—	2.7	10.3	.7	3.6	7.7
Contests	4.7	5.3	7.2	4.7	4.5	18.	1.9	4.6	1.5	10.	9.4	4.7	3.5	7.	1.7	1.8
Miscellaneous	1.2	1.3	.9	6.8	4.3	.7	.4	1.3	3.2	1.4	5.1	13.6	.1	8.3	.1	.3
Total (Editorial)	37.8	38.9	52.4	50.6	53.1	54.9	34.4	32.7	67.2	34.2	49.2	56.4	57.6	44.1	61.6	52.5
Advertising	37.7	35.1	42.1	27.7	37.8	43.	43.9	39.4	27.9	39.3	22.3	5.5	24.1	27.1	35.7	22.8
Grand Total	100.	100.	100.	100.	100.	100.	100.	100.	100.	100	100.	100.	100.	100.	100.	100.

*In La Presse, only the second section, which deals with Farming, has been considered.

crops. Also included hereunder is all space devoted to news and reports of ploughing matches and any meetings that are primarily concerned with soil or field crop problems.

Dairy includes all space devoted to the breeding, feeding, health, and care of dairy cattle and all articles on dairy equipment, butter and cheese production and all dairy problems.

Horticulture includes all articles concerned with *fruit, vegetables* or *gardening*. The first two of these subdivisions need no explanation. Under gardening is included all space devoted to the care and planting of flower gardens, all articles on lawn and landscaping and all features used in connection with this subject. Much of the space devoted to this subject is placed in the actual home section of the various magazines, but it was deemed advisable to include it in the Agriculture section under the correct heading.

Poultry includes all space devoted to the breeding, feeding, care, and health of all poultry. As is the case of animal husbandry, all space devoted to questions and answers concerning poultry is included under the farmer's service classification.

Market Data includes all information on market conditions in any country and all market quotations and statistics. Also contained hereunder is all space devoted to discussions on the marketing of any or all farm produce.

Correspondence includes all space that is devoted to the publication of letters from subscribers and designated as such. This does not include letters concerning home problems or subjects. If subscribers are asked to contribute letters on a specific subject and if these letters are published under an appropriate heading, they are classified according to subject matter and are not included under this subdivision.

Farmer's Service includes all space devoted to the publication of the answers to questions received from subscribers concerning all but home problems.

Farm Mechanics includes all articles concerning the construction, maintenance, and repair of farm houses, buildings, machinery, and equipment.

General Agriculture includes all articles of an agricultural nature that have not been classified under any of the previous subdivisions.

Articles on the agricultural policies and characteristics of foreign countries are contained hereunder. Included in this section are all articles that cover so many of the previous subdivisions that it is impossible to classify them correctly.

Home

Health and Beauty includes all space devoted to beauty culture, all articles on health and the answers to all questions received concerning health.

Religion includes all articles of a religious nature, Biblical studies, religious essays, hymns, church news and activities.

Style, Fashions, Patterns, and Handicraft includes all space devoted to patterns and fashions. All articles on the making of clothing, rugs, curtains, etc., are included under this classification.

Cooking, Food, and Recipes includes all space devoted to food preservation and preparation, cooking methods, and equipment.

Youth and Child, Health, Care and Interest includes all articles of interest to children. All children's puzzles, stories, cartoons, games, etc., are hereunder included. Also special articles concerning upbringing and training of children are placed under this heading.

Correspondence includes all space devoted to the publication of letters concerning home interests and activities.

Home Furnishing, Homemaking, and Housekeeping includes all articles concerned with the interior arrangement, furnishing, planning and upkeep of homes.

General Home includes all articles concerned with home interests and problems that have not been previously classified. News of the activities of Women's Institutes and other such organizations are contained under this classification.

General

Editorial includes all space especially designated as editorial.

Fiction includes all types of fiction, including lineage of illustrations used therein.

Features includes all space devoted to short articles that regularly appear in the individual magazines. Most of these are of a philosophic, semi-humorous type. Some are in verse form. They cannot be adequately classed according to subject matter.

Humour includes all space devoted to jokes, comic strips, and all articles that are in the magazine solely because they are humorous.

Music, Art, Literature, and Poetry includes all space devoted to discussion or criticism of books or authors. The other items in this classification need no explanation.

Current Topics and News includes all articles and the illustrations used therein, concerning world conditions, news from any country and also current political developments.

Sport and Radio includes all space devoted to radio programs, pictures of radio artists and all discussions concerning radio. Very little sporting news of any kind is contained in these magazines.

Contests, Tables of Contents, Cover and House Advertising includes all space devoted to contests sponsored by the publisher. The other items need no explanation.

Miscellaneous includes all contents not previously classified.

ADVERTISING

(All Advertising is included under this heading)

The actual amount of space devoted to the various classifications is all that has been considered. No attempt has been made to compare or evaluate the quality of the contents.

It is hoped that this analysis may be of some value to advertisers in the selection of media, and to publishers in comparing periodicals within this important field.

College of Arts
Medical School
Class Organizations
Fraternities

in fact, all printing in connection with the University of Western Ontario and affiliated organizations given special attention.

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